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ABSTRACT

This manual is for the training of linking agents between Education R&D and schools and for training teachers in the process of intrinsic analysis of curriculum materials. Intrinsic analysis means analysis of the instruction or process through examination of the materials, or artifacts, including teacher and student materials, developer's rationale, record forms, scope and sequence charts, tests, media package, and other relevant concrete components of the product or system. The manual includes instruction, exercises for practice of key skills, analysis instruments for both products and processes, an instrument for description of the instructional model, a listing of step-by-step procedures, and an annotated bibliography. (Author)

Intrinsic Analysis Training Manual

By

Doris T. Gow

Pennsylvania School Improvement Program

PSIP

Intrinsic Analysis Training Manual

For the training of Linking Agents between Educational R&D and schools and for training teachers in the process of intrinsic analysis of curriculum materials.

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Pennsylvania School Improvement Project (PSIP)

Preface

What the manual is:

Intrinsic analysis of curriculum products, instructional practices or management systems is taught by this manual. Intrinsic analysis means analysis of the instruction or process through examination of the materials, or artifacts, including teacher and student materials, developer's rationale, record forms, scope and sequence charts, tests, media package and any other relevant concrete components of the product or system.

The manual includes instruction, exercises for practice of key skills; analysis instruments for both products and processes (long and short forms); an instrument for description of the instructional model; a listing of step-by-step procedures; and an annotated bibliography.

Advantages of the manual:

The intrinsic analysis system provides more information, more reliable information, and more relevant information to schools using it for analyzing their present program or proposed adoptions that usually is provided by publishers, product catalogues or nationally distributed analyses because it includes the following unique features:

1. It is designed to be site specific. Questions in the analysis instruments are addressed to needs of the school which uses the manual. This produces an analysis tailored to those needs.

2. It is a research-based analysis model with the research on each element cited in an annotated bibliography.

3. It translates the research supported classroom concepts of "direct instruction" and "engaged time" into their equivalents in instructional materials and systems terms.

4. It leads to identification of the critical elements of the curriculum or system model by the analysts who, in most cases include those who will implement the model. This should facilitate appropriate adaptation to site without undermining the critical elements which make it work.

5. It provides a systematic logical procedure for quality rating and comparing curricula while allowing and facilitating a group process of decision-making that is based on commonly defined elements. This makes it ideal for the PSIP process for both program analysis and selection.

Limitations of the manual:

1. This manual does not teach all the skills required for performing an intrinsic analysis of a curriculum product or process. Some necessary skills are prerequisite general teacher competencies. Others are skills based on the analyst's knowledge and understanding about characteristics of his or her colleagues and the students they teach.

2. While the constructs and questions which are the substance of the instruments and which direct the analysis process are research based, there are only a few references in the manual. This is purposeful to avoid cluttering up the description of the process with scholarly references. Each concept within a construct provides a slightly different perspective on the construct and reader concentration is needed to assimilate the concepts.

In place of such references, there is an annotated bibliography keyed to the constructs and the skills taught in the manual.

3. The identification of the critical elements of a curriculum or a process model is more of an art than a science. Effectiveness of each product or process may hinge on different elements. Some curriculum models are heavily dependent on their subject matter specific teaching methods or strategies. Some models are effective largely because of their structure or management system. Some effective curricula are highly complex and have many critical elements that appear to be interdependent.

Under these circumstances, a procedure is required for recording all cues to the critical elements of the model as the analysis proceeds. Then, as more and more is learned about the product or process, these notes may be revised and focused until at the conclusion of the analysis, the analyst can use the model instrument to tease out the model. The whole analysis process immerses the analyst in the curriculum or process components and the final step simply focuses and refines the accumulated perceptions.

Therefore as the analyst proceeds through this manual, he or she should note cues to the elements that appear to be emphasized as important to effectiveness and any evidence in support of the elements should be identified and noted, also. These are essential procedures not systematically alluded to in the instruments or the text.

Table of Contents

Intrinsic Analysis Training Manual.

Introduction

This manual is a description and instruction in the use of the process of intrinsic analysis of curriculum products and of management systems practices or processes. This type of analysis has been used to provide Local Action Teams of the Pennsylvania School Improvement Project with a more in-depth analysis of their present program than usually is undertaken in the program analysis phase of the PSIP process. It has been used, at the request of the LAT, for analyses of all or any designated part of the school's present program or for analyses of products or processes being considered for adoption.

The manual is built around an intrinsic analysis instrument which has three parts and two forms. One part is for analysis of student and teacher materials, inservice materials or parent materials (SIP form). These could range from single modules for a one-day workshop, through course textbooks with teachers editions, to extensive multi-level, multi-media total instructional programs.

The second part is for management systems practices or processes (MPP form). It could be used to analyze a behavior modification project in a classroom, a self-management system, a process for individualizing any presently used basal text, or any other system which is not instructional content based.

The third part of the instrument consists of a series of questions which guide the analyst in uncovering the instructional model of any product or process being analyzed and suggest some considerations related

to the model and its significance for effective implementation and adaptation of any innovation.

Finally, in addition to these instruments, there are two selection charts which may be used to summarize the information gathered in the analysis process. One chart is for products and one is for processes. Summative quality ratings on the analyzed dimensions of several products or processes may be listed and compared to facilitate decision making.

The two forms of the intrinsic analysis instruments are a short form, which is appropriate for practical use and a long form which is useful primarily during the process of acquiring the skill of performing intrinsic analyses. The long form includes questions which may require examining a particular dimension from a slightly different perspective than the analyst would use based on the short form questions. It supplements and complements the short form and is useful in pointing up the many aspects of any product or process dimension which add to or detract from the quality of the dimension.

Rationale for Intrinsic Analysis

There are many reasons for analysis and evaluation of curriculum products and processes[1] of which problem identification in present programs, curriculum supplementation or new curriculum product or process selection are most obvious. For all of these purposes, some already available analyses may be used before an independent intrinsic analysis is undertaken.

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[1] Administrators may conduct analyses to support present programs before parent groups or school boards, although outcome data usually are used for this purpose. Analyses of programs may be used as a first step in their revision. Analyses may be a part of staff preparation for accreditation.

There are two types of available analyses:

1. Product catalogue descriptive information obtained from developers including the following:

   a. NIE Product Catalogue.

   b. Educational Programs That Work (validated programs).

2. Analyses by teachers performed under the auspices of product information exchanges:

   a. Educational Products Information Exchange (EPIE) Product Information Catalogues.

   b. Social Science Education Consortium's, CMAS analyses (Boulder, Colorado).

   c. State-validated programs (e.g., An Evaluation of Instructional Materials, San Mateo County Office of Education, Redwood City, CA., 1974).

However, not only are these analyses likely to provide less information than is needed for decision making in weighing the advantages of similar products or processes, they also are not applicable to the specific constraints and criteria and identified problems of the local site. An on-site intrinsic analysis of present program materials and possible adoptions is necessary for making the most appropriate possible choice for the following reasons:

1. Intrinsic analyses examine the instructional materials themselves or materials used for teaching or managing (student texts, teacher manuals, workbooks, record forms, tests, etc.) rather than the outcome data or descriptions of the programs.

2. Emphasis is on the dimensions identified as crucial to the identified local problem, making the analysis a site-specific one.

3. An intrinsic analysis reveals the crucial elements of the instructional models of potential innovations. This may be important for effective adaptation and implementation.

Constructs, Artifacts, Elements and Criteria

The Constructs

Opportunity, Structure, Motivators and Instructional Events are the four constructs employed in the PSIP process. Originally identified as part of an evaluation model developed for evaluation of classroom processes by William Cooley and Paul Lohnes (1976), the constructs have been defined by PSIP in terms of some elements (variables) that are the same as those Cooley and Lohnes look at and some that are different because PSIP's purposes are not evaluation of classroom processes but, rather, diagnosis of need and analysis of potential instructional products or processes to meet the identified need. All of these constructs have been found to be related to effectiveness of instruction. Some of the variables which Cooley and Lohnes use to define the constructs, however, are not used in the PSIP intrinsic analysis process (e.g., total time in school or amount of time spent on the subject under analysis.) Those variables that are used in intrinsic analysis are those which are applicable to the instructional materials themselves. Obviously, curriculum materials do not usually prescribe how much total time should be spent in school, nor even how much time should be spent on the particular subject the materials teach.

The instructional materials themselves are the raw material for the analysis process and the first step in that process is the collection of those materials or artifacts.

The Artifacts and the Elements

The analysis instruments tell the analyst the questions to ask about each dimension of the curriculum product or process but not where to find the answers. The instruments are purposely constructed to be tools in the analysis process and therefore are as brief and simple as possible. However, to serve the needs of the novice analyst who may not know immediately where to look for the answers to the analysis questions, a chart of steps in performing an intrinsic analysis has been constructed and appears, with the instruments, in the appendix. It includes listings of the curriculum materials or artifacts that should be gathered to perform each step in the process.

While in most instances, the questions make self-evident which element of the curriculum or process should be looked at after the materials have been gathered, the following brief overview tells what artifacts to use for examination of which element to answer which questions. It, therefore, provides a quick survey of the analysis process.

Opportunity. The elements of a curriculum which the analyst examines to determine whether or not the materials themselves substantively provide sufficient opportunity for the student to learn are the concepts, the content and the skills taught by these materials. These may be identified through expressed objectives or may be implied in the lessons and/or test items. Therefore, scope and sequence charts, lists of course or unit objectives and a sampling of lessons and test items on those lessons should be collected and examined for

appropriateness and relevance of content, concepts and skills for these students.

For opportunity through curriculum usage, a sampling of lessons and tests and management system record forms should be examined to determine intensity of treatment and adaptiveness of instruction to student needs.

Motivators. The artifacts and elements of the curriculum which should be examined to determine whether or not the materials provide sufficient motivators to encourage the students to learn are the following:

1. student materials (texts and workbooks) and student record forms for opportunities for self-direction, self-selection, self-evaluation, program planning.

2. teacher's manual and student activities follow-up in workbooks and text, for intrinsic reinforcement and directions to teacher to provide extrinsic reinforcement.

3. all materials, for variety in format, method, mode, and strategies of instruction.

Structure. The artifacts and the elements of the curriculum that should be examined to determine how well-structured the curriculum is to assure that instruction builds on previous instruction towards terminal goals, are the following:

1, objectives, for their match to the characteristics and needs of students.

2. lessons, for their teaching to objectives.

3. tests, for their match to objectives and lessons.

4. scope and sequence chart, for how well objectives are structured and sequenced towards terminal goals.

5. teacher manual directions, for the degree of guidance for diagnosis and remedial treatment.

Instructional Events. The artifacts and the elements of the curriculum that should be examined to determine how well the materials teach and help the teacher to teach are the following:

1. teacher's manual, for quality of directions to teacher and background information.

2. student materials, for quality of directions to student and clarity of procedures.

3. management system record forms, for ease of use in managing instruction.

4. student materials, for appropriateness of instructional strategies for this population and adequacy of strategy usage.

In summary, the elements to be analyzed and their location in the instructional materials are shown below:

Elements	Location
Opportunity	
Concepts	Scope and sequence charts.
Content	Lists of course and/or unit objectives.
Skills (behavior demanded of student)	Sampling of lessons. Test items on lessons.
Instruction	Lessons, tests, record forms.

Dimension	Location
Motivators	
Directions, selection, evaluation and program planning procedures.	Student materials, student record forms, teacher's manual.
Intrinsic and extrinsic reinforcement process:	Descriptions of student activities and directions to students.
	Directions to teacher for interaction with students.
Range of format, method, mode, and strategies.	All instructional materials.
Structure	
Objectives in relation to students.	Objectives
Lessons in relation to objectives	Lessons, objectives, tests.
Tests in relation to objectives and lessons.	
Structure of objectives	Scope and sequence chart
Diagnosis and remedial treatment process	Teacher manual directions
Instructional Events	
Teacher instructional directions and background information.	Teacher's Manual.
Student directions for instruction.	Student materials.
Class management process	Management system record forms.
Instructional strategies in relation to students.	Student materials.
Instructional strategies in relation to research.	

Criteria

The criteria for evaluation of curricula are based, necessarily, on research or empirical evidence of effectiveness. The weighting of research and experience in evaluating each dimension must be a professional judgment of the analyst. However, the intrinsic analysis process, by systematically focusing on a limited number of dimensions (constructs) which research has shown to make a difference reduces the confusion of comparing diverse curricula to a reasonably manageable process.

This manual, in the interest of calrity and brevity, does not cite research, and the number of examples is limited. There is, however, an annotated bibliography which attempts to fill any gaps this expedient measure may create and, hopefully, to alleviate any threat of the manual seeming to be prescriptive without substantiation.

Analysis of Student Materials, Inservice Materials, Parent Materials

Preparation and Previewing

Preparation and previewing of a product or process is carried out as it is described in the listing of steps in performing an intrinsic analysis. It would be pointless to repeat those steps here. However, some definitions and examples may serve to clarify this first procedure.

One of the questions (B1)[1] is addressed to the relevance of the emphases of content, concepts and skills. By content, throughout the analysis process, we mean information, facts, events, people that are to be learned or learned about in the curriculum being analyzed. For example, if your school is looking for math materials that heavily emphasize the metric system, you will respond to B1 that content is not appropriate if the descriptive material or analyses you have assembled reveal that content ignores the metric system.

By concepts, we mean categories of things (general ideas, usually expressed by a word) that are organizing elements of a discipline. A concept in reading comprehension is theme. If this concept is considered essential by you and is mentioned in your assembled materials, and if a substantial number of other concepts which the analyst considers essential are also referred to, it may be safe to assume, at this point, that the concepts are those appropriate for this school and its student population.

By skills, we mean both discipline specific abilities, such as the ability to decode in reading and general skills such as the ability, in any subject area, to apply. analyze, synthesize, etc. If you expect your students to acquire higher level skills of analysis and synthesis and the

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[1] Numbering system of analysis instruments.

instructional materials never demand that he or she analyze (a sentence, perhaps) or synthesize (perhaps by writing an original story), you would respond to B1 that the skill emphasis is not appropriate to meet the needs of this school.

(Later in the process of curriculum analysis, we will describe how you analyze content, concepts and skills. For the moment, only their appropriateness is examined.)

Another question asked in the previewing phase of analysis (B2) refers to the match of the instructional method employed in the materials to be analyzed and its match to the theoretical and philosophical orientation of the teaching staff.

By instructional method, in the analysis process, we mean the general orientation used to teach. For example, inquiry is a method. If you want your students to conduct research, to ask critical questions about events and information rather than to accept without question everything they are told, you would not respond favorably to materials that purport to be highly didactic.

Whether or not there are enough components available to meet the needs of the staff of the school which is using or contemplates using these materials and whether or not those that are necessary can be purchased within the school's budget is another important consideration for the previewing phase of analysis.

All of these previewing questions may be applied to present materials as well as to materials being considered for adoption. However, this last question (B3) is particularly important for present materials

since its significance so often is overlooked when something appears to be causing problems. Frequently, with the blessing of salesmen who may endorse the use of a curriculum without a component which the school cannot afford to buy, a school will attempt to operate without a crucial component, wuch as the criterion-referenced tests in a structured program. This could be the source of the problem. To purchase a new program, possibly also without some key component, would be no solution at all.

If a curriculum requires an expensive variety of media including tapes, filmstrips, records, supplementary individual reading materials, etc., and if the school's budget is limited, then the consideration of whether all these components are necessary to successful operation of the program is extremely important.

The final question in previewing of materials (B4) is site specific. The constraints or criteria identified by the local action team are applied to the particular curriculum under consideration. While local constraints and criteria are used in prescreening, that does not affect present curriculum analysis and even in the preparation for selection, it is possible a candidate may have slipped through the screening even though it did not meet all the local school's constraints and criteria.

When the preparation and previewing phase is completed, the analysis of products or processes proceeds through each of the succeeding steps construct by construct.

The Construct, Opportunity

Under the construct, opportunity, the opportunity to learn based on the substance of the instruction, refers to the notion that time spent on appropriate instruction for the student is opportunity to learn. Actual time spent, as has been mentioned previously, is a highly important variable of instruction, but is not a variable that can be determined through an intrinsic analysis of materials themselves. The match of the content, concepts and skills to the needs of the students can be used to determine the substantive quality of time spent in instruction with these materials. That is, the opportunity these materials provide for these students to learn.

IA. The questions asked to determine if the activities, content and concepts are appropriate for the student population so there is opportunity to learn are the following:

1. Are the activities appropriate for the developmental level and socio-economic characteristics of these students?

2. Is the content relevant to these students?

3. Are the concept examples provided relevant to the students' experience, needs, stage of instruction, so conceptualization can occur?

To respond to the first question above, it is necessary to find out from the assembled objectives and lessons what the student is required to do. An example of appropriate match of developmental level of student to activities would be for a student at Piaget's concrete level of operations (roughly ages 7-12), to manipulate concrete materials in executing math

problems. An example of an activity appropriate to socio-economic level would be a substantial amount of oral responding for high socio-economic level students.

The first criterion of appropriateness is based on Piaget's developmental psychology which identifies developmental stages characterized by different capabilities. It also has been supported by research in the use of manipulatives. The second criterion is based on a study by Brophy and Everтson who found that time spent on oral responding is mose productive for high socio-economic classes.

When the analyst has asked some of the questions in these analysis instruments and examined instructional materials to find answers, it will become increasingly clear how these constructs may be applied to the analysis of materials (rather than the evaluation of classroom processes for which the constructs were intended). For example, it should be apparent that if the activities in the instructional materials demand behavior which the students are not capable of performing, they will not have the opportunity to learn.

Other specific criteria based on information known to the analyst, whether from empirical evidence or research, can be used to determine whether the materials are appropriate for developmental level and socio-economic characteristics of the students.[1] Similarly, for every question in the analysis instruments, the analyst's own knowledge and experience will provide breadth and depth to the process.

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[1]The instrument questions may suggest to administrators or linkers possible inservice topics that the LAT might find to be of interest. such as the use of a consultant on Piaget's stages of development and their relevance to elementary school curriculum selection and/or an inservice seminar on what research can tell us about the relationship between socio-economic characteristics and learning style.

The question on content relevance to the student (IA2) is not a technical question, but rather demands knowledge of the student body as a whole, and of each individual student, to be aware of the range of their present knowledge, interest, needs and concerns. For example, rural students might be uninterested in stories about city children if the stories assume some knowledge and understanding of urban problems which the rural student does not have. Content which assumes this knowledge and builds on it could be confusing and uninteresting to the rural child. It would not provide opportunity to learn for this reason. This doesn't mean rural children want to (or should) read only about similar children, but unless the content is presented in such a way that it provides sufficient prerequisite information to be understandable and is presented interestingly, it seems irrelevant, and the opportunity to learn could be lost. On the other hand, reading related to student interests should be rated as highly relevant.

The third question under opportunity, substance (IA3) on whether concept examples permit the student to conceptualize is also related to characteristics of the student including experience, needs and stage of instruction. Since each student's experiences are different, when a new concept is introduced, examples of concepts are best chosen from instances that it is safe to assume nearly all the students will have encountered. Early in instruction, concept examples also should be most characteristic examples. That is, they should be examples which have the fewest irrelevant attributes. That technical-sounding term can best be explained with an example and my favorite example is whale. A whale is

a mammal but many of its characteristics are not shared by other mammals. These characteristics which are not shared with other mammals are non-defining (or non-critical) attributes and so, are irrelevant. When first encountering the concept, mammal, such examples should be used as man, dogs, cats, etc. The range of examples should be extended as instruction continues.

If a new concept is introduced with very few or inappropriate examples, the student may under or over generalize so that he or she cannot recognize examples of the concept. Such instruction does not provide the student with the opportunity to learn.

Of course, teachers often recognize this and supplement instructional materials with their own examples. Nevertheless, in selecting materials, one basis for comparison may be the appropriateness of concept examples.

Long form questions: One way to further elucidate the intent of the instrument questions for each construct is to break the questions down into component elements, each a more precise question the analyst may ask of the materials being analyzed to get a better handle on their adequacy. The long form of the questionnaires is simply that - the essential questions plus some further clarifying questions.

The following are those questions for opportunity, substance: (They are numbered as they are in the long form analysis instrument.)

IA1 a. Are all written explanations and directions for students simple, uncomplicated, straightforward and easy for this age level to understand?

b. Is the objective of each task assignment expressed clearly for the student to know explicitly what s/he must do, how well? If it is not clearly expressed, is it very obvious from the wording what behavior is expected and the level of performance required?

IA2 a. Does the content relate closely enough to the student's own knowledge and experiences to build on them? Does it offer enough new information to provide opportunity to learn that can be related to what is already known?

b. Is there content (i.e., facts, information, events, people) that you deem essential, which is left out?

IA3 a. Is there instructional material available to teach essential concepts, written in vocabulary at the level of the lowest student? Has some of the instruction been planned to challenge the most advanced student?

b. Are concept instances selected so that early in instruction they have few irrelevant attributes (or characteristics that are not the essential defining characteristics of that concept class)?

Are concept instances, late in instruction selected which have more irrelevant attributes and hence are more difficult to recognize as examples of the concept?

c. Are there concepts (i.e., classes of things that are the important organizing centers of a subject) which you consider essential that are left out?

IB. The questions asked in analyzing the usage of materials to determine whether or not they teach in a clear, focused, concentrated way and adapt to individual differences so that all children have the opportunity to learn are the following:

1. Do the materials supply concentrated cognitive activity for the student to assure adequate opportunity to learn?

2. Do the materials provide the opportunity to learn for both slow and fast students and do they provide for different learning styles?

To answer these questions, samples of the objectives, lessons, tests and management system must be examined to determine how much of what the student reads, does (learning activities), and responds to (questions, tests), is what could be designated the curriculum materials equivalent of "direct instruction." Another term that may be used is "intensity of treatment" which may be defined as concentrated cognitive activity in lessons; criterion referenced tests written for clear, specific objectives; and a management system that encourages on-task behavior without undue delays for irrelevant non-cognitive activities.

There is substantial support for the concept of "direct instruction" which may be stated concisely as the engagement of the teacher in teaching the attentive student directly (Rosenshine, 1976, 1977) "Intensity of treatment" in instructional materials is a concept used by the author of this manual to denote the comparable interaction between materials and students when the materials follow sound pedagogical practices for adequate presentation, response, practice, review or evaluation.

This means materials which provide intensity of treatment are by definition those which provide ample opportunity for the student to learn through a kind of instructional materials form of direct instruction. In addition, the teacher directions may support and provide directions for the concept of direct instruction as Rosenshine defines it.

Teachers often describe instructional materials as "too easy" for this group or "too difficult" for that group. Of course this may mean the objectives are not appropriate. However, not infrequently the "too easy" materials are overly repetitious, contain reading that is irrelevant to the objectives, or contain activities that do not require the student to exhibit the objective behavior. Materials, in short, may be more filler than meat.

Occasionally materials designated "too difficult" may be totally appropriate (if the objectives are suitable) although the intensity of treatment which provides opportunity to learn may have seemed excessively intense cognitive activity to the teacher reviewer.

Adaptability of the management system and the instructional materials to individual differences in pace and learning style is another way that curricula can provide opportunity to learn through materials usage.

If the management system and teacher directions suggest self-pacing or provide for review or recycling through previously studied materials if needed, they probably are reasonably adaptive. Learning style may be accommodated if there are choices of method, mode and media. Moreover,

there should be instructions to the teacher in how to diagnose and manage this kind of variety.

Long form questions: for clarity, focus, concentrated instruction and adaptability to individual learning differences:

IB1 a. Is there opportunity provided to learn each expressed or implied objective?

b. Are there enough learning activities to maximize the students' opportunities for learning?

c. Do the materials suggest or provide sufficient direction to make possible direct instruction (i.e., teacher-directed instruction) a large part of the time?

IB2 a. Are the exercises and tasks demanded of the student diverse enough so that students' different learning styles can be accommodated?

b. Do the instructional materials supply enough practice for these students to learn?

c. Does the management system suggested by the materials permit adaptation to individual pace?

The Construct, Motivators

IIA. The questions asked to determine if the student has opportunity for self-direction, selection, evaluation, which have been found to be motivating, are the following:

1. Does the student (parent, teacher) select instructional activities?

2. Does he or she plan his/her program?

3. Does he/she have an opportunity for self-evaluation?

Opportunity for self-direction, selection, evaluation may be highlighted in the teacher's manual directions or spotted in the student's management materials. Self-selection of instructional activities often is highlighted in developers' claims, and the management system and scope and sequence chart may be examined to identify the range of options for selection. Self-direction and evaluation may be identified by checking materials for answer keys to tests. There should be listings of follow up activities to tests, with students' directions for what to do next based on the score in the test.

The motivators construct as used for evaluation of classroom processes is divided into curricular motivators and interpersonal motivators. It would seem that the former would be important for intrinsic analysis of curriculum products while the latter would not be relevant to materials. However, that is not so. Both are important to intrinsic analysis.

Materials may suggest, either in the activities they provide or in the directions to the teacher in the instructor's manual, interpersonal motivators that are related to self-direction, selection, evaluation (IIA 1-3).

Some of these could be the opportunity to tutor others or be tutored, to plan to work with others on self-selected aspects of the program, or to evaluate others' work or to have others evaluate the student's work. In other words, while evaluation of classroom processes necessarily looks to planned or spontaneous classroom interaction as a source of data, intrinsic analysis of curricular materials looks at interaction which takes place between materials and students or which is prescribed in the materials for student/teacher or student/student interaction.

IIB. The questions asked to determine if the materials provide reinforcement or instruct the teacher how and when to do so are the following very straightforward ones:

1. Do the materials provide reinforcement?
2. Do the materials provide feedback?

Reinforcement in the materials themselves is not difficult to locate. Often the student is promised that mastery of an objective may be followed by a desired activity. This is the well-known Premack principle, which suggests that any higher probability behavior (the desired activity) can be used to reinforce a lower probability behavior (the work that leads to mastery of the objective).

Teacher praise and punishment may be behaviors suggested in the teacher's manual with circumstances for their use as well as directions for how and what to do. The teacher's manual may suggest the frequency and kind of feedback that should be provided. Feedback also is provided by the teacher in correcting oral or written work. Of course, an answer key is a form of feedback to the self-directed student.

IIC. The questions asked to determine if there is sufficient variety in the materials to appeal to student interests are the following:

1. Is there variety in method, mode, format, and instructional strategies?

2. Are there alternative paths through the materials to accommodate individual differences?

3. Is content appealing to a range of interests?

4. Are materials functional, related to life experiences?

Extent of variation in materials to encourage student interest is identified by straightforward examination of the methods used, the media and the teaching strategies. Teachers always have looked at instructional materials with their students' interests in mind. The research literature describes the most popular reading for various ages. However, children's interests are as individualistic as their other differences such as pace, alternative path choices, preferred medium, etc. Each teacher can be the best judge of such differences and analysis should attend only to opportunity provided for a range of options and to site-specific interests, since each class will differ somewhat and instructional materials are purchased for more than one class and more than one year.

We know that novelty and change are motivating. Also, too great consistency in format can lead to students learning how to manage the system rather than learning the instructional content. It can result in rote learning. Also, of course, the routine that is established by repetitions of identical activities with only the content changed can be boring.

The last question was added to the instrument because empirical evidence seemed to suggest that in basic skills the knowledge and the evidence through activities that make it clearly apparent that the instruction has utility are motivating to students.

Examination of materials for adequacy of motivators is not as specialized an analysis process as that required for any of the other constructs. Perhaps this is because teachers are familiar with reinforcement, adaptation to individual differences and self direction, selection and evaluation as motivators. Also, the application of the opportunity construct to materials themselves is a specialized procedure and analysis of both structure and instructional events depends upon processes that are not taught in most schools of education.

Questions which appear under the construct, motivators, in the long form of the analysis instrument further define and clarify the concept. They follow:

IIA1 a. Have the materials taught the student or provided guidelines for the teacher to teach the student how to make appropriate selections?

b. Is there any variety in procedures for making selections to accommodate individual differences in self-directedness, complementing the teaching and/or guidelines in 1a?

IIA2 a. Is the student allowed to plan his/her own time without prior instruction in how to do so? How adequate are the directions for this independent kind of behavior?

IIA3 a. Is there instruction in <u>how</u> to evaluate his/her own work?

b. Is the student eased into self-selection, self-evaluation in a step-by-step fashion appropriate to the developmental and experimental level of the student?

IIB1 a. Does the instructor's manual provide examples of appropriate reinforcement procedures?

b. Does the student see the objectives or are there checklists or some recognition of progress that the student can use to monitor his or her success?

IIB2 a. Are the directions to the teacher for providing feedback and motivators sufficiently clear and are the signals in the materials for how and when to use them sufficiently attention-getting to encourage their use?

IIC1 a. Are there too many activities of the same kind which might become boring to the students?

b. Is the student allowed to tutor a peer or be tutored by a peer?

IIC2 a. Do all students move through the materials in lock-step or are there opportunities for students to have unique programs that meet their needs?

b. Where there are a variety of possible pathways and individual programs of study, are the teacher's directions adequate for effective management of this variety?

IIC3 a. If I were the age of these students, would I find these materials interesting? If I were of similar background and experience as these children, would I probably enjoy working with these materials?

The Construct, Structure

The construct, structure, is an extremely important one and is supported in the research literature, both from the perspective of the instruction, and the organization of the classroom, as the LAT members well know. The structure of the instruction is the first concern. The first two groups of questions are primarily directed to that concern. Portions of the materials that facilitate maintenance of a well organized classroom are the concern of the final two groups of questions.

IIIA. The question asked to determine if there are specific expressed or implied instructional objectives on which the instruction is based is the following:

1. To what degree does the instruction teach to the objectives?

If it is not possible to infer the objectives from the materials, the instruction would suffer from lack of direction. The presence of specific expressed instructional objectives very much facilitates the work of the teacher. If made available to the students, objectives tell them what they must do, under what conditions, and how well. These terms, of course, define a well written behavioral objective. Yet, there is no specific question in the instrument, as there are in most analysis instruments, on whether or not there are objectives.

The reason there is no such question is that the mere presence of expressed or clearly implied objectives is necessary, but of itself, not sufficient. The inability to infer objectives from the materials when they are not explicit is very important, as noted. However, the important

consideration for structure is how well the instruction teaches to those expressed or implied objectives.

Sometimes objectives are quite general or are expressed as themes and skills. In such cases, the specific objectives must be inferred from the student activities and/or the assessment instruments. For example, a theme may be "people live together in society." Clearly the concepts would be sociological. If the students' activities include reading about styles of living of different socio-economic and ethnic groups in this country and the test questions ask for comparisons, one objective that could be inferred would be the following: Compare and contrast ways of living among various given socio-economic and ethnic groups in American Society. In such fashion, one could make inferences about objectives if they were not expressed.

A well structured set of objectives may lead clearly to the terminal goal, but unless the instruction teaches to the objectives, the student cannot master them. This matching, at this point, is not related to psychological or pedagogical concerns, (which are attended under instructional events) but only to the faithfulness of the match. For example, suppose one objective is that the student should be able to write a complete, complex sentence using descriptive adjectives and adverbs. If the student activities demand the writing of lists of adjectives and adverbs; the writing of simple sentences; underlining of subject and predicate; repeating the definition of a complex sentence; but do not require the writing of the kind of sentence the objective specifies, the materials are not adequate. Sometimes instructional materials list objectives that are tested, for which the various necessary prerequisite

skills are taught, but they fail to include activities which require the student to perform the terminal behavior demanded by the objective at any time during instruction.

The structuring of the objectives is the most difficult aspect of curriculum to analyze. It also depends most heavily on the model of instruction the analyst adheres to. The process taught in these training materials is based on a structured-curriculum model of construction. Some interactive models of instruction may not be as pre-structured as the structured-curriculum model presumes. However, some provision must be made in any purposeful instruction with goals and objectives, for the instruction to proceed from entering behavior to terminal behavior, and research clearly supports small-step, carefully structured instruction in basic skills.

IIIB. The questions asked to determine how well the objectives are structured and sequenced to build towards the terminal goals are the following:

How well are the objectives structured and sequenced to build toward the terminal goals?

1. As indicated by a concept analysis? (sampling)
2. As indicated by a content analysis? (sampling)
3. As indicated by a skill analysis? (sampling)

To determine if the objectives are structured and sequenced to build toward the terminal goals (B1, 2, 3), an examination of a scope and sequence chart may be sufficient for identification of gaps or deficiencies in objectives which the analyst perceives as essential to achievement of

the specified behaviors. Or, on the contrary, such a chart may appear to the analyst to be totally satisfactory or, indeed, to be more inclusive than is absolutely necessary.

When there is any question about any portion of the curriculum; when a particular terminal objective has given trouble in the past with these students; or when there is not available an adequate (i.e., explicit and detailed) scope and sequence chart, it may be necessary to sample expected trouble spots in the curriculum and do a comprehensive analysis of them. Even if the developers have provided an adequate description of the curriculum materials' structure, a comprehensive structural analysis may provide the analyst greater confidence in his or her estimate of how well these instructional materials have been structured.

If there is an expected trouble spot in the curriculum that is analyzed for structure, that same portion also should be checked to be sure the instruction teaches to the objectives (IIIA1) and subsequently, that the testing procedures are adequate for that specific portion of the curriculum. This may require the analyst to go back and forth in the analysis process rather than to follow the step-by-step procedures in the prescribed sequence. However, this is an inevitable consequence of using spot checking or sampling for expedience.

The processes of analysis described here are derived from the PIC Design/Analysis Model (Gow, 1976, 1977). The three analyses are done separately for both design and analysis, but are combined into an instructional hierarchy for design. For analysis, the hierarchy may be the explicit objective sequence or may be implicit in the instruction, but it

is the initial point of take-off for the analysis of structure (rather than the terminal of the structuring process as it is in design).

Although all this sounds complicated, it isn't. In less explicit terms, analysis is the reverse process from design, and analysis of structure can begin with the objective scope and sequence chart or with the instruction which is built on such an implicit or explicit chart.

Of the three analyses (concept, content and skill), the content one is easiest to describe and to perform because it is familiar to us. This is so because the familiar textbook table of contents is a logical ordering of the curriculum content. Teachers examine the table of contents to determine what a particular textbook includes and what it omits. The process of content analysis of a course, a unit or a lesson is the process of identifying the teaching sequence of the content. The criterion for appropriateness of that sequence under this construct is the degree to which the content is ordered logically (i.e., temporally; simple to complex; concrete to abstract; familiar to unfamiliar, etc.) and the appropriateness of step size between content objectives for the target population.

Concept analysis is a more difficult process for most analysts. This is partly because teachers (and others) customarily consider the concept structure as identical with content structure. It is this separation of content structure from concept structure that is the unique feature of the PIC Model, and it was conceived in recognition that one or the other may be emphasized but they may not both be equally well structured.

To perform a concept analysis one identifies the major concepts taught in a portion (sampling) of the curriculum and analyzes the process (sequence) in which they are organized to be built and combined into principles, generalizations and constructs. To perform such an analysis and to judge the quality of the organization of conceptual structure, it is preferable that the analyst be an expert and/or an instructor in the subject area being analyzed. If the LAT includes one or more specialists in this subject, their judgment probably should take precedence over that of a non-specialist. The conceptual structure of a particular discipline may be obscure to those to whom the discipline is not a major area of concentration. If the LAT does not include a specialist in this subject, it might be appropriate to consult one.

The third kind of structural analysis that should be performed to estimate the adequacy of a curriculum's structure is a skill analysis. This analysis may be a fine-grained analysis of an early reading program, perhaps, using Gagné's learning hierarchical sequence, or for most curricula, other than the early stages of reading or math, a Bloom hierarchy. To perform such an analysis, one examines the behavior demanded of the student in any given sampling of the curriculum.

If the lessons are preceded by objectives, the focus for a skill analysis is on what the objectives say the student will do. For example, the student will "name" is at the knowledge, or lowest level of Bloom's Taxonomy. The student will "translate into his or her own words" is the second, or comprehension level, etc. The succeeding levels are application, analysis, synthesis and evaluation.

If there are no explicit objectives, nevertheless what the student does to carry out the lesson activities is the skill. Each behavior which demonstrates he or she has been instructed, by reading, writing, talking, interacting with students, teacher or others, or manipulating the instructional materials provided, is one step in the hierarchy of skills that is the framework of the instructional sequence.

A finer grained analysis may be necessary for some student behaviors, especially those demanded in early reading, for example. Gagné's hierarchies may be better suited for such an analysis. For example, Gagné labels learning of language sounds as stimulus-response learning, the lowest level in his hierarchy. Recognition of printed letters by sound is at his second level: chaining. Multiple discrimination includes distinguished similar words.

For levels higher than multiple discrimination, it is better to use Bloom's levels. Indeed, Gagné's S-R, chaining, and multiple discrimination could be considered subcategories of the knowledge level of Bloom.[1]

The order in which behaviors should be structured in any given sequence may not, necessarily, be the order in which every child will learn best. When a designer develops his instructional sequence he attempts to provide an optimal sequence based on logical, psychological and pedagogical considerations.

For the analyst, the construction of such a sequence is not at issue. The analyst's task is to identify gaps and deficiencies if they exist.

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[1]Bloom's Taxonomy levels and Gagné's hierarchy levels are in the exhibits in the appendix of the manual.

Since content, concept and skill analyses have been described here, are outlined step-by-step in the chart of procedures, and are practiced in the exercises at the end of this manual, it will suffice, at this point, to provide examples of how possible gaps or deficiencies might be identified.

Gaps or deficiencies might be found to exist in content, concepts or skills under any of the following circumstances:

a. If the analyst, in performing the analysis finds that a piece of essential information in the content sequence, or an essential skill is presumed to have been previously acquired by the student although the analyst is aware it is not in the repertoire of these students. (e.g., the students are to read stories with many unfamiliar words which they must sound out, using context for meaning, but have had little or no experience deriving meaning from context in simpler problems. The student is expected to find information in the library, but has not acquired library skills.)

b. The analyst discovers that one or more of the three analyses (content, concept, skill) reveals the developer has omitted an important step in the instructional sequence. (e.g., the relational terms above, below, behind, before are being taught. The hierarchy includes objectives to teach each term separately in relation to a concrete object, to teach discrimination among the terms taken together in relation to a concrete object, to teach the terms in the same order in relation to an object on a page in a book and on a chart on a board. Left out of the sequence is instruction in these terms in relation to the student himself.)

c. The instructional hierarchies are all truncated. They teach at the knowledge and comprehension level only. Students are seldom asked to apply, analyze, synthesize. They may, on the other hand, be asked to synthesize without any steps in between comprehension and synthesis. (e.g., the terminal objective is to write a poem, which is a synthesis level objective. The students have been asked, in the other steps leading up to this, to read poems, recite poems they have memorized, and tell the meaning of poems. The highest level is translate: comprehension. However, they have never learned rules for writing poems, applied each of them, and analyzed poems to identify how the rules had been applied by the poet. Had these tasks been part of the hierarchy, it would progress from translation to application and analysis before reaching synthesis.)

These examples were purposely chosen because they are kinds of omissions teachers customarily take care of almost automatically and because they are not gaps recognizable only to a specialist in reading or math. Teachers plug gaps daily. However, materials that require such measures are inferior in construction to those that do not. Some of the gaps might require filling only for the student who has trouble learning. Some may not be as readily recognizable as these examples and yet they may be crucial.

Determination of the presence or absence of a testing procedure and its adequacy is essential to structure since the student's progress from one objective to the next objective hinges on mastery of the first one before he can work on the subsequent one.

IIIC. The questions asked to determine if there is a testing procedure adequate to determine mastery of the objectives are as follows:

1. How well do the test items, observation guidelines or other mastery criteria match the implied or explicit objectives?

2. Are all objectives, stated or implied, measured or checked by observation and are criteria provided?

a. affective?

b. cognitive?

c. psychomotor?

The first of these questions refers to the match of the expressed or implied objectives to the test items. ("Are the test items indeed criterion-referenced?" is essentially the question.) A test item may demand behavior that is something less than, different from, or more than the objectives specify. In any of these cases, the structure of the curriculum, as defined by the objectives scope and sequence, is weakened and must be judged inadequate.

In the case of affective objectives, usually there is no testing procedure possible. However, if the objectives are well-written it is possible to identify observable (through not testable) behaviors acceptable as evidence of achievement of the objectives. Sometimes these are provided by conscientious developers in the form of observation guidelines and/or checklists. The second question attends to each domain of objectives, if domains other than the cognitive are relevant. Furnishing of criteria for evaluation of objectives by the developer is very helpful to the teacher.

While this discussion of structure has centered on analysis for structure of new materials, the match of instruction tests and objectives is of major concern in the analysis of present program as well. In addition, the use of standard achievement tests may cloud the issue by calling attention to supposed inadequacies that may be real or may be simply the result of adequate instruction for different objectives.

For example, if you feel you have a problem in mathematics because your standard achievement scores are low, but, on the other hand, the items in the standard achievement test do not match your objectives or your instruction, there may be no problem at all, unless it is a problem of redefining goals and objectives or selecting different tests as the measures of progress which are valued by the school. You simply are not measuring what you teach. That is an administrative problem, not an analysis problem. Similarly, if your instruction does not match your objectives, you are giving lipservice to behaviors you are not teaching and probably cannot hope to have students reach the goals to which those behaviors are prerequisite.

All of this seems obvious and therefore to mention it seems unnecessary. However, this often is not considered in analyzing present materials and selecting new ones. In the preparation and previewing of materials, the content, concept and skill emphases and the instructional method appropriateness to your school (match to your students and teachers) has been considered. This is one kind of matching that is important to the intrinsic analysis process. Often in the examination of instructional materials, the expressed or implied objectives are evaluated separately from the instruction and the curriculum tests without considera-

tion of their interrelationships. The closeness of match of objectives, instruction and curriculum tests, however, is one measure of quality of structure. As any curriculum designer well knows, objectives and tests usually are written before the instruction or lesson is written. Tests simply ask that the student demonstrate the behavior described in the objective. Then lessons are designed to teach to the objective.

It would seem that determining the match of objectives and tests would be an easy task. For some reason, it is not. Probably that reason is habit. Certain behaviors are tested in certain ways which may be inappropriate, but which have been unquestioned except in university classes in testing. Progress through a well-structured curriculum cannot be measured if the three way match (objectives, lessons, tests) does not exist. Therefore, to determine if a curriculum is or is not well-structured, the analyst must be able to master the skill of identifying such a three-way match or lack of it. Some exercises at the end of this manual are designed to provide both practice and a check on your ability to carry out this analysis task.

Long form questions: The explanatory value of the more precise questions in the long form instrument for the construct, structure, probably will be greater if the questions on the first three portions under structure (ABC) are listed here. This is so because these refer to the substance of the materials while the final portion (D) refers to the props provided the teachers in the use of the structure for organizing the classroom. These additional questions follow:

IIIA1 a. Do randomly selected objectives have matching instructional materials which both teach and require demonstration of the identical behavior described by the objective?

IIIB1 a. For each generalization which is a part of an expressed or implied objective are the component principle and concepts taught?

b. For each principle which is part of an expressed or implied objective are the component concepts taught?

IIIB2 a. When content previously encountered is the subject matter of later instruction, are references made to the earlier instruction to help build cognitive bridges and instructional structure?

IIIB3 a. Do the behaviors required of the students fall within the same taxonomy levels or are all levels of behavior sampled, when this is appropriate?

IIIC1 a. Are there self-test items in end of chapter and/or end of unit, or other curriculum tests which demand the behavior expressed in the selected objectives so the students are made aware of what mastery tests will require for progression?

IIIC2 a. For expressed affective objectives, is there any guidance in determining how to judge whether they have been attained? Is more than one example of criterion behavior supplied in the teacher's manual or in other guidelines?

b. When a concept is taught, is it tested by requiring the student to distinguish between examples and non examples and to generate a new (e.g., untaught) example?

c. When a principle is taught, is it tested by requiring recall of component concepts, by requiring stating the principle and/or by asking the student to apply it, or describe how it could be applied, or to describe cases where it would or would not be applicable?

d. In generalizing, do students generate their own examples of the generalization?

e. In problem solving, do students select the appropriate principle and solve the problem?

IIID. The questions asked under section D of the analysis instrument, designed to determine the quality of the guidance supplied by directions to the teacher in instructional materials and the teacher's manual are the following:

1. How adequate are the props which the instructor's manual provides to guide the teacher in diagnosis of student needs and for placement and progression?

2. How adequate is the guidance supplied by the teacher's manual for alternate, remedial or suppiemental instruction for students?

3. To what degree do the range of the objectives alone or the objectives combined with the remedial or supplemental instruction match the range of the student population?

The first two questions require an estimate of the adequacy of the help which is furnished in the diagnosis of student needs. Does the teacher's manual tell you <u>how</u> to judge where the student should begin, <u>how</u> you will know when he or she should move on to a new task and which task? Are there alternate materials, remedial materials and/or supple-

mentary materials in the program or are there suggestions for what you can do to offer each of these as needed by your students, as well as suggestions for how you can tell that they are needed? Any part of these questions to which the response is "no" should be considered a valid reason for judging the quality of this dimension as less than satisfactory.

Even if the structure of a program is perfect, if there is no consideration given to how each student using the program will progress through it, it cannot be considered well-structured. Even with adequate structure and options for alternative, remedial and supplemental instruction, if the teacher is not informed about how to employ these alternatives, he or she cannot be expected to provide optimally structured instruction.

The final consideration, under this construct, is the degree to which the range of the instructional objectives, including the above-mentioned options, meets the range of needs of the population to be served (IIID3). If the materials under consideration fail to meet the needs of any considerable segment of the school population, it would be economically unfeasible to purchase them. Supplementing the materials could undermine their carefully structured sequence as much as could a failure to use them appropriately because of inadequate instructions.

Long form questions which further explicate this portion of the structure questions are the following:

IIID1 a. Is there a scope and sequence chart to provide an overall picture of the structure of the instruction?

IIID2 a. How readily can remedial or supplementary materials be plugged into this structure? Does some simple and feasible coding system appear to be possible for facilitating use of all available materials which can be fitted into the curriculum structure?

b. How well does this course, as it is structured, fit into the total school curriculum in this subject, especially the immediately preceding and succeeding courses?

The Construct, Instructional Events

The final construct, instructional events, is restricted to consideration of how the materials teach and what they tell the teacher about how to teach. Some instructional materials fail to take the teacher into the designer's confidence. The instructional methods, and the philosophy behind them, may have been briefly mentioned in a forward or in advertising literature, but often the specific strategies used in the student instructional materials are not identified and the rationale for them is not revealed. This is unfortunate, since the teacher cannot support and may, indeed, defeat the purpose of strategies of which he or she is unaware. It is hoped that the skill of analysis, as taught in these materials, may help teachers to identify the strategies which developers have employed and have not described for the user.

The instructional events construct is divided into substance and usage. Instructional events, substance, refers to the quality of methods and strategies used in instruction and the quality of support given the teacher for monitoring instruction which employs these methods and strategies through explanation of how and why they are used. The intrinsic quality of content concepts and skills taught is also a concern under this construct as well as the efficiency of the management system which keeps the instruction in the materials functioning so that students and materials are interfacing to the maximum possible extent.

Instructional events, usage, is the element in these instruments that calls upon the analyst's background knowledge and experience in instructional psychology and all the possible input from the PSIP agencies

to update the analyst's knowledge and understanding of what research implies for practice. Here the most recent prescriptions for how to teach the subject being analyzed can be plugged into the process.

IVA. Instructional Events (substance). To determine if the teacher's manual provides sufficient teaching assistance the following questions are asked: Do the materials provide:

1. information on methods?

2. information on strategies?

3. background information, vocabulary (definitions of terms) and procedures?

If the method used throughout the materials is inductive and the student is expected, through examples, to learn a concept or to acquire an understanding of how a principle works the instructor should be informed that this is the method used and the rationale behind it. Usually, for young children, a concept that is abstract is taught inductively because the child is still at the stage of concrete operations. Some children might be thoroughly confused by a teacher who was not informed that this was the method used and who attempted to define, and teach the children to define, abstract concepts they could better learn to induce from the examples given in the materials.

Some developers are very conscientious in providing teachers with the rationale for their selection of methods and strategies and include background information that can be most helpful. An example that will illustrate this point may be found in the Individualized Science Program (IS) developed at LRDC. In a level A lesson designed to teach the student

to explore alternate ways of sorting objects and to explore the concept of class inclusion, note in the following description the tremendous teacher support offered in the background information:

> The lesson activity is built around a kit containing a bouquet of flowers. The students name the flowers, sort them, are asked to suggest other ways of sorting them and continue until they have run out of suggestions for sorting. (e.g., Bouquet: flowers, leaves, Bouquet: roses, daffodils, carnations, philodendron leaves, dahlia leaves, etc.).
>
> Then the suggestion is made to the teacher that the examples given are made in one sort and multiple sort could be introduced by asking students to sort the flowers by kind and the leaves by kind, and then the flowers by color.

Other suggestions are made: to draw a chart, to ask questions such as "are there more roses or are there more flowers? Are there more red carnations or are there more leaves?"

Finally, there is this note:

> This DGA* is not designed to teach the student how to answer these questions, but rather to explore the idea of class inclusion. When asked, "Are there more roses or are there more flowers?" it is fairly typical for a student at this level to answer that there are more roses. He looks at the three classes of flowers and notes that there are more roses than daffodils and more roses than carnations. He is comparing the number of flowers and that, therefore, there are more flowers than roses. Don't tell him that his answer is wrong, but discuss the answer with him. Ask him questions that will help him identify the class of flowers and the class of roses. If you are interested in reading more about this behavior pattern in children, it is discussed in detail in books by Jean Piaget and in books about the work of Piaget.)

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*Directed group activity

IVB. To determine intrinsic quality of content, concepts and skills, the questions ask for an estimate of:

1. content quality.
2. concept quality.
3. skill quality.

To examine content, concepts and skills for substantive quality is not the same as the examination of these same elements for their match to the school's goals which is part of the previewing phase of materials analysis. It is different from the scrutiny of the same elements for the opportunity they provide for learning because of appropriateness and relevance to student experience needs etc. The perspective on these three elements (content, concepts, skills) in this instance is also different from that involved in the analyses done for evaluation of structure and the examination of their appeal as motivators. It is an examination of the intrinsic quality of the instructional content, concepts and skills and the instructional events in which they are embedded.

Skills may not be rated of high quality, for example, if consistently, throughout the materials, they sample only knowledge and comprehension level behaviors. Teachers often speak of materials which have this failing as requiring "only memory work."

Judgment of content and concept quality tends to be rather subjective or to be very much contingent on the analyst's philosophy of education or his or her methodological orientation in the subject field. For example, which particular letter sounds should be taught at the beginning of instruction, and how many should be taught how fast, are theoretical

questions which could draw forth four or five different responses from four or five different experts. The advocate of a linguistic approach might respond differently from the advocate of an information processing approach or an eclectic approach. Dr. Isabel Beck and Ellen McCaslin, in analyzing eight beginning reading programs, found that the phonics instruction in four basal programs (Ginn, Houghton Mifflin, Bank Street and Open Highways) was inappropriate for compensatory education students. This was based on their analysis of the phonemic analysis instruction in these programs. It was also based on their belief in the necessity of very careful and explicit teaching of phonemic analysis skills. In short, how one judges the intrinsic quality of the instruction in student materials is affected primarily, by the methodological orientation of the analyst.

IVC. Questions asked to determine if the management system is efficient enough to support the quality of instruction are the following:

1. Can students work steadily without delay or threat to the affectiveness of instructional events?

2. Can teachers manage instruction without frequent breakdowns in the system?

These questions deal with the level of support provided by the management system for the instructional events evaluated by the previous questions. No matter how good the quality of content, concepts and skills as measured against current expert opinion or research, if the management system is not efficient enough to support the effectiveness of these instructional events or the teachers cannot manage the system, because

of its complexity, without frequent breakdowns, the quality of this instruction will not pay off.

For example, let us use, again, the Beck, McCaslin report on reading and the explicit teaching of phonemic analysis skills. Usually, this involves the teacher holding up cards and modeling the sounding-out process. In an individualized program, the management system must permit the teacher to carry out this instruction with large or small groups as needed while others are occupied in other activities. To be effective, the system must support the variety of activities required without a breakdown.

In the ECRI program, for another example, the highly structured process includes sounding out the word aloud, spelling it and writing it. The invariant characteristic of the procedure helps to make it work. The students very quickly learn what is expected of them and the teacher's ability to check out responses of several children speaking in unison and writing simultaneously is tremendously facilitated by this invariance in the system.

Judging the management system's adequacy is difficult without seeing it in action or trying it out. However, as in judging the quality of teacher props in the first group of questions on the substantive quality of instructional events, the amount of effort that is put into supporting the teacher with rationale, detailed procedures, alternatives, and suggestions of what may be expected from the students in their response to the instructional events, often is a prediction of how effective the system will be in operation.

Long form questions: The questions that further clarify the intent of instructional events, substance are the following:

IVA1 a. Do the instructions to the teacher specify whether or when the materials teach inductively or deductively? Do they indicate if a discovery, guided discovery or individual inquiry method is used? Are they used in accordance with appropriate pedagogical procedures?

IVA2 a. Are instructional strategies ever mentioned at all in descriptive or teacher materials? If they are not, it must be assumed that the teacher's cooperation is not required for effectiveness unless there is evidence to the contrary.

IVA3 a. When the materials require an introduction by the teacher or a synthesis, is the required information supplied for him or her or must the teacher supply it?

b. In presenting any information to the teacher on methods or strategies, are all terms defined and all procedures described?

IVB1 a. Does the teacher who will teach from these materials feel that the content is what should be taught in this subject to these children? What do the experts say the issues are? Taking these issues into consideration is this the content you would choose?

IVB2 a. Are these the concepts scholars in the field recommend should be taught to children at this stage of their development?

IVB3 a. In order to teach the children learning-to-learn skills, are all taxonomic levels sampled in these materials?

IVD. Instructional Events (usage). The last two questions in the SIP form of the intrinsic analysis instruments relate to the usage rather than the substance of the instructional events. The questions asked are the following: Are the instructional strategies and methods appropriate for this student population and are they used effectively?

1. Appropriateness of strategy selection and usage?
2. Appropriateness of methods selection and usage?

Methods, of course, may be chosen because of the kind of students the materials are to be used with or the nature of the subject matter. For example, a deductive method of teaching an abstract concept may be most expedient for adult learners when the same concept would best be taught inductively to children not yet at the stage of formal operations. Inquiry might be the method of choice for an elementary school science program which claimed to provide hands-on experience manipulating substances and machines and attempted to develop curiosity about natural phenomena. A deductive approach would be inappropriate in such a case. Strategies that would be most appropriate with one student population might fail miserably with a different population.

A mathetics (or backward chaining) approach might be very effective in teaching a young student a memorization task such as learning to recite a poem. For an adult student in a poetry appreciation class who would find that approach tedious, it could be more effective, and better suited to the purpose of the course, to teach it by asking the student to analyze the poem, identifying the major concepts, the rhythm and the rhyming pattern, and then to use these to facilitate recall of the poem.

There is only one long form question under this portion of the instrument, but there is also a list of strategies for the analyst to check out and to supplement with his/her own favorite strategies.

IVD1. a. If the materials claim to use certain instructional strategies, do they also tell how they are used so you can judge the appropriateness of selection and usage?

b. Following are some instructional strategies that you might want to check for and to ask yourself: Are they appropriate here and are they used correctly?

small steps
cues and prompts
questions distributed through instructional materials (rather than only at the end)
advance organizers
backward chaining
concept-learning strategies based on range of instances
subject area specific strategies such as modeling in blending
practice
reinforcement
feedback

Summary of Criteria

Criteria for prescreening are essentially those identified by the LAT. Constraints must also be considered. Procedures for prescreening require matching of the identified philosophy goals and objectives of the school with the emphases in content, concepts, skills and instructional method of the materials.

Appropriateness and relevance of the activities, content and concepts to the student population and degree to which they teach all children in a clear, focused, concentrated way and adapt to individual difference are criteria for evaluating the amount of opportunity the materials

being analyzed would provide for students to learn. The appropriateness should be in terms of all the dimensions along which children differ which may be related to learning, if we have some knowledge of the way to deal with these differences.

How motivating the materials may be is judged on the basis of the amount of self direction, self selection and self evaluation; the reinforcement provided by materials and suggested to teachers; feedback to students on their work; variety; interest, and functional quality.

Structure quality is based on explicitness of objectives and their match to lessons and tests; the appropriateness of the content, concept and skill sequencing; and the adequacy of guidance supplied for the teacher in diagnosing and in remediation.

Instructional events are evaluated on the basis of the quality of assistance provided the teacher on methods, strategies and background information; the quality of instruction intrinsic in the materials based on what research suggests as effective; and on the efficiency of the management system to support this quality instruction. The appropriateness of the use of the instructional strategies and methods for this particular population, and in the suggestions to the teachers for use of these strategies and methods, are the final criteria for analysis.

Analysis of Management System, Practices or Processes

When a curriculum product is analyzed, as was described in the preceding pages, the built-in management system (if any) of that product is analyzed concurrently. However, when a school contemplates the adoption of a new instructional practice, such as a method for individualizing instruction using its present materials, the kinds of questions one asks are different. This is so because the system, practice or process used is the primary focus rather than the student, parent or in-service instructional materials which are the primary focus of a curriculum product.

If the management system is the sole change from present program, the burden of proof that the innovation will result in improvement rests entirely with the system itself. Therefore, a special instrument has been developed that attempts to direct the attention of the linker and the LAT to the salient questions about the system, to help determine whether or not it would be a feasible solution to the school's problem. An example of a management system is IGE, Individually Guided Education.

In some instances, schools may contemplate selection of practices or processes rather than a management system. Such practices might be special procedures for teaching reading, such as the EGRI system. This is more than a management system. It is a special set of instructional practices. The Management Systems, Practices or Processes instrument (MPP form) may be used for sets of practices or procedures as well as for management systems. ILA, individualized language arts, also is a set of procedures.

The particular artifacts which must be assembled for the intrinsic analysis of a management system, process or practice are the student and

class record forms, the teacher's manual or other handbook to provide guidelines for implementation of the system, process or practice and any objectives or tests provided by the developers. Rationales produced by the developer may be especially helpful. If training is supplied, it would be most helpful to have a description of the training program, or, better still, the program itself if it is a written one. Except where indicated specifically in the following commentary on the analysis process, any or all of these assembled materials will have to be examined to respond to the questions in the management system, practices or processes instrument.

Preparation and Previewing:

As in using the SIP form of the instrument, the first steps in preparation and previewing are to determine appropriateness for the particular site and the match to the theoretical and philosophical orientation of the staff. The wording of the questions is the only difference between the two forms. For products, the emphases on content, concepts and skills are matched to the school's emphases and the instructional method is matched to the philosophical and theoretical orientation of the teaching staff. The processes or systems form of the instrument addresses the same concerns but the questions ask about appropriateness of the management system, practice or process and the match of the practice or process to the theoretical orientation of the teaching staff.

Clearly, there may be differing philosophical or theoretical orientations among staff members, but they must be resolved during this previewing stage if the selection team is to reach a consensus on a product or process all members can work with.

The Construct, Opportunity

IA. The questions asked to determine if this system or practice provides more time for learning are the following:

1. To what extent does the system or practice give the student more on task time?

2. To what extent does the system or practice give the teacher more time to teach actively or to guide student learning?

The degree to which a system or practice permits more on task time for the student is crucial to the effectiveness of the innovation since more on task time provides the student with greater opportunity to learn. Obvious as that sounds, it is a factor that is being emphasized by many of the recent major research studies which, rather apologetically, report that the more time actively engaged in learning a particular subject, the greater the achievement in that subject. It does need to be reiterated, in spite of its seeming to be clearly evident, that of course students learn better if they are actively engaged in learning than if they are not. We tend to carry on more and more activities in the classroom that are not cognitive. Many of these may be management activities. If a system is clear and simple, or it its complexity is so designed that when fully functioning it provides the student with adequate time for cognitive activity, it probably should receive a high quality rating for opportunity.

Similarly, if a set of procedures supply concentrated on-task time for the student, they are likely to facilitate learning and the opportunity quality rating for the process should be high.

The extent to which a practice or system gives the teacher more time to teach (i.e., to engage in direct instruction) or to guide student learning is the next decision which must be made and a quality rating must be generated.

Among the management system artifacts that may be considered, advantages which are likely to provide teaching time (as opposed to excessive management time) for teacher are the following:

a) a scope and sequence chart which includes indications of remediation, supplementation, and branching sequences.

b) notes to the teacher, either in the teacher manual or teacher's edition of the instructional materials, on what the student's options are at the conclusion of each lesson, unit, section of the course.

c) notes to the student on how to correct his/her own work and what to do next.

d) simple record forms for students providing scores or indication of mastery and a record of objectives completed and in process.

e) class record forms which show, preferably at a glance, where each student is at the moment.

If the class is not individualized, it is none-the-less important that any management system provide teacher props to make it as easy as possible for the teacher to know where each student is in the program of instruction. If the records are based on groups rather than individuals, it is still essential that the system provide a systematic way of keeping track of each student. The only difference with groups is that students may study and move in lock-step rather than individually.

The Construct, Motivators

IIA. The questions asked to determine if the system or practice offers advantages to both student and teacher which will encourage co-operation in implementing it are the following:

1. To what extent does it save the teacher time and/or effort?

2. To what extent does it help the teacher teach more effectively?

3. To what extent does it help the student spend more active time in learning what he/she finds interesting?

The consideration under the construct, motivators, is very much related to and may be based on the information generated in analyzing opportunity for learning. However, here the focus is the degree of motivation that is generated by the freeing up of the teacher to pursue professional tasks because of the efficiency and effectiveness of the system. For the LAT member, the ultimate test of the motivational quality of a process or management system would be, of course, in the usage of that process or system. A high rating under the opportunity construct would seem to guarantee a high rating under IIA1, saving time and effort for the teacher. Yet, this may not be so. While a system or process may clearly provide more time for learning, the analyst may feel that the teachers in this school would not consider it a saving of time and effort that would be motivating to them for a variety of reasons. They might have tried a systematic way of recording progress for each student in the past and may have found it burdensome in spite of its obvious efficiency when fully operational. For the teachers who felt this way, even though they might

agree that it permitted more on task time for students and direct instruction by teachers, the practice or system might not seem to be a sufficient saving of time and effort to make it motivating to them.

The second question under the motivators construct (IIA2) relates primarily to processes, although it is conceivable that an efficient management system, in some affective way, by keeping the teacher calm and concentrated on task, could lead to more effective teaching. A behaviorist process of reinforcement might lead to more effective teaching, for example, as might a process such as the Pennsylvania Department of Education's Comprehensive Reading/Language Arts Plan (PCRP) using four critical experiences: responding to literature; self-selected and sustained silent reading; composing-oral and written; and studying language patterns.

The third question under motivators (IIA3) is on the motivational aspect of the amount of time the system or process provides for the student to do what is interesting to him or her. This, of course, means cognitive activity of interest, not non-academic interests. One example of this might be the aforementioned Pennsylvania Reading/Language Arts program's self selected and sustained silent reading feature, which has the potential for being motivating for all children if properly implemented. In some schools where reading already is the "thing to do," it might be judged immediately and without reservation as a program that is highly motivating to the student.

IIB. The questions in this instrument designed to determine if the system or practice provides the student with more independence in managing his own learning are the following:

1. To what extent does the student have a chance to select his own topic, reading, activity, etc.?

2. To what extent does he have a chance to correct his own work, decide when he is ready to go on to a new activity?

3. Is the student allowed to work with his/her own friends, tutor or to be tutored or otherwise interact, cognitively, with peers?

This portion of the instrument's items on motivators hinges on the known motivational effect of self-management. Questions 1-4 explore the extent to which this motivational effect is permitted to operate through selection of topic (unit, perhaps), activity (which lesson); to correct his/her work; to judge mastery and subsequent activity; to plan his/her own time, or to decide with whom he or she will work.

All of these items are relevant to either a management system or a practice or process. An example, among R&D outcomes for student planning of his/her own time is the Self Schedule System, which is an instructional management system designed to allow different children to work on structured and unstructured learning activities at the same time within a classroom. It helps students take increasing responsibility for planning and carrying out their own activities with minimal teacher direction.

Systems or processes may not be designed so specifically for the purpose of promoting self-direction and yet may permit it. The key and important term in the above description, however, must be kept in mind in evaluating all self-directional activities, whether self-scheduling, self-selection or self-evaluation: "increasing." The analyst should observe whether the system throws the child in to sink or swim, requiring him/her

to demonstrate self-management behavior immediately, or whether the system teaches self-management behavior by permitting increasing amounts of it, with full instruction in how to do it. In the latter case of successive approximations, a process or system should be highly rated, but not in the former instance, because no practice could be judged motivating if it were threatening, and any "sink or swim" procedure would be a threatening one.

The Construct, Structure

This construct, used to assemble analysis information for systems or practices, is closely related to the just-discussed self-management dimension under motivators because the latter, as we have indicated, cannot be adjudged motivating if it is not taught in steps. The focus under the structure construct is how well sequenced and appropriately spaced are the steps, not only of self-management but of any other behavior which is managed or which is the objective of the process.

IIIA. Questions asked are:

1. To what degree do the objectives match the identified problems in the target school?

2. To what degree are adequate instruction and/or explicit directions provided for user of the system, process?

3. To what degree do the demands of the objectives match the capabilities of the students and teachers and the constraints of their environment?

The first question is an evaluation of the relevance of the objectives to the identified needs of the school, as these objectives are

expressed in a management plan, scope and sequence of behaviors chart, or process objectives listing. The fit between the identified needs of the school and the objectives, individually, is a prerequisite consideration to the appropriateness of the entire structure of the process or system.

Analysis of structure is considerably less complex for a system or process than for a product, since a product is multi-dimensional, while a system or process is, essentially, synonymous with a structured sequence of procedures. Therefore the major questions become a) the match of the objectives to the school's problems, and to the capabilities of students and teachers, as well as to the constraints of their environment, and b) the care with which the structure is maintained by adequate instructions to users.

An extreme example of a non-productive management system for a given school would be one which required use of a computer when a computer could not possibly be made available to that school. That would be an environmental constraint. Clearly such a system would not reach the point of analysis because it would be screened out. A less obvious example, that could reach the point of analysis, would be a management system that demanded a specified weekly planning period, which a given school might not be able to provide within the constraints of its scheduling and personnel limitations.

A further example might be a process such as Self-Scheduling. This system might be given a very poor quality rating by some LAT members who were searching for a procedure which would relieve them of excessively de-

manding management duties (as Self-Scheduling would do), but who would consider themselves incapable of yielding authority to students to decide when they will do which task.

Particularly in reading, grouping often is a concern of teachers. A management system that provides for grouping and regrouping of students for reading and which prescribes recordkeeping and decision making procedures for such grouping might well be a proposed adoption.

Quite clearly, a grouping system and a self-scheduling system would be incompatible, but one group of teachers might prefer the former and another group, the latter. If this kind of difference could not be worked out during previewing, it might possibly result in more than one selection rather than a single choice.

The Construct, Instructional Events

This construct in the management systems, processes or practices instrument is a measure of the degree to which the system or practice permits the teacher to be more effective. The major question is the following: Does this system or practice permit the teacher more time to plan and carry out carefully selected instructional strategies appropriate for these students?

IVA. The means by which this could be provided is described in the three analysis questions:

1. To what extent does the system relieve the teacher of management, clerical duties.

2. To what extent does the system itself incorporate use of effective instructional strategies?

3. To what extent does the system permit and encourage creative teaching (beyond what is prescribed) by suggestion, example, instruction, etc.?

While similar to the question on direct instruction (under opportunity), and the motivator, saving of teacher time and/or effort, the focus here is the quality of the instructional events the process or system makes possible. If it is a system, it may relieve the teacher of management duties so that he or she, indirectly, is permitted to arrange more effective instructional strategies. If it is a process, it may incorporate effective strategies. An example of this would be ECRI, which is a process for teaching reading that incorporates a host of effective instructional strategies.

Most processes are highly prescriptive (as are management systems) and they may prescribe effective strategies for the very situations which the needs assessment phase of the PSIP process has identified as situations which require attention. Question 3, however, goes beyond the actual focus of the process or system being analyzed, to the degree to which it permits or encourages creative teaching.

Examples of this would be management systems which provide suggestions, examples, and how-to-do-it instructions for use of a variety of research-based instructional strategies appropriate for ~~given~~ anticipated or unanticipated situations. How to handle behavior problems through behavior modification procedures, for example, could be a suggested strategy. How to provide the student with advance organizers on which following learning could be built (or, in Ausubel's terms, under which it would be subsumed), would be another example of instruction in effective strategies.

In short, the quality ratings the analyst gives to the dimensions analyzed under instructional events are based on the degree to which the system, process or practice frees the teacher to teach while supporting the effectiveness of that teaching by incorporating within it effective strategies, or encouraging and teaching the teacher to incorporate such strategies in the process of instruction.

Summary of Criteria for MPP Form

Criterion for evaluating the quality of a management system is primarily the degree to which it provides strong support for the teacher. This is true, also, of most processes. They are designed to provide systematic assistance to the teacher in carrying out effective instruction.

For the construct, opportunity, freeing up of student and teacher for more on task time and direct instruction is sought. Self-management for students and saving of time and effort for teachers, as well as aid in teaching more effectively, are the goals for the motivators construct.

The match of system or process objectives to needs and capabilities of students and teachers and the provision of user directions and instructions are criteria for the structure construct.

Instructional events quality hinges on both appropriate instructional strategies which are a part of the system and the provision of suggestions, examples, or instruction for the teacher in how to use other instructional strategies that can be expected to work. Relief from non teaching duties, which a system or process might provide, is also a criterion for quality of instructional events, since it can give the teacher time to plan instruction in advance.

Analysis of the Curriculum Model or the Instructional Management Process

The identification of the curriculum model or of the essential elements of the instructional management process usually is a spin-off of an intrinsic analysis. By examining each important dimension of a curriculum in depth, the critical elements of that curriculum inevitably are highlighted. Therefore, the model instrument is not meant to be used independently of either of the two analysis instruments. It does not serve to identify the curriculum model or the essential elements of the instructional management process. It does serve to suggest important questions which must be attended if a product or process is to be adopted, in order to facilitate its effective implementation. The initial assumption is that the analyst knows, or thinks he knows, what the model is. If s/he does not know, the questions should reveal the fact and further research on product or process will be required.

I. The first question in this instrument refers to the critical elements of the model. Often, the developer attempts to explain to the consumer the rationale behind the program he has developed. Sometimes, the research support for the design elements is explicitly cited. Usually, a developer who writes a documented rationale will provide, also, a very clear description of those elements of the model which are vital to its effectiveness. If this is available, it is one source of data for the analyst's response to this question. The information gained from carrying out an intrinsic analysis on the product or process is the other source.

During the intrinsic analysis process, the analyst has been making notes on any critical elements of the product or process which are

revealed as he or she carried out each analysis procedure. The preface of this manual alerts the analyst to the need to make notes on these elements as they become apparent.

Since the dimensions which are emphasized in each product or process may be different, it is impossible to suggest what to look at or where to find it in order to identify the model. However, there are a limited number of dimensions that can differ from model to model and these intrinsic analysis procedures, by organizing information under four major constructs help to systematize the information on the product or process so that the model stands out quite clearly.

At the end of the analysis process, the notes that have been kept on critical elements should be reviewed and revised, if necessary, as a result of the overall impression of the model that remains after examining all the available artifacts. This results in a listing of critical elements. Such a revision and refinement is a feature of this curriculum model or instructional management process instrument. It is designed to lead the analyst to an explicit statement of his or her own, supported findings on the model.

The reason the critical elements of the model should be listed in detail, is to recall them to the mind of the individual analyst and to make them readily available to debate with other members of the LAT if there is disagreement on what is critical. It is better to resolve the question of critical elements at the time of selection rather than to have serious disagreement and, perhaps, less than optimal implementation later.

By critical elements, we mean the features of an innovation which make it work. There is substantial evidence that programs often are what they say they are in name only because what is essential to the innovation has never been implemented or has dropped out in the course of being adapted to the local site. Usually, this is not purposeful, but happens because the adapters have lost sight of the critical elements of the model they have chosen.

A typical example of this may be drawn from the early days of Individually Prescribed Instruction (IPI), which permitted students to move through the materials at their own pace. A critical element was diagnosis on the basis of pretests. It was found some teachers pretested and then, even if the student mastered the pretest, they made him/her do the lesson anyway instead of going on to the next lesson. When challenged on this, in almost every instance the teacher expounded the philosophy: "Practice makes perfect." They were undermining the curriculum they had adopted by ignoring a critical element of the model.

On the other hand, sometimes teachers who have not recognized what is critical have been apologetic to the developers because of changes they have made during adaptation, which have been non-essential features of the curriculum and entirely acceptable. An example of this would be the addition of different books in any selected reading portion of a curriculum in order to permit a more interesting choice of books to the particular students in this school. As long as the books were at the same reading level as those they were substituted for, it would not affect the program.

II. The second question is an attempt to support the itemized critical elements generated in response to Question 1. Acceptable as evidence that particular elements are critical would be any statements of the developer in support of them, either with research or empirical evidence or the logic of the developer's rationale.

For example, for the self-schedule system mentioned previously, in addition to the specific objectives of the program which detail outcomes in terms of what the child will be able to do, there are also listed goals of the system, the design of the system and student and teacher functions. From this wealth of explicit information on the purposes of the system it is possible to deduce what elements are essential and what elements are desirable but not critical to the successful operation of self-scheduling.

This does not mean that the process of identifying critical elements and listing the evidence that they are critical is a process of eliminating as many elements as possible which the developer has specified as important, in order to have a manageable description of the product or process that will merit the designation, model.

It means, rather, subsuming or incorporating as many elements as possible that have common characteristics under one superordinate category in order to identify a minimal number of categories which can be designated elements of the model. A model is, by definition, a representation or pattern of something.

Curriculum products or processes never can be nor should be identical in every setting, nor even in every classroom within a given setting. However, to attain the results attributed to a given product or process, key features (the model) must be retained. It is these features that may

or may not be made explicit by the developer or publisher in the materials themselves, and it is these features that must be identified and, particularly if they are implicit rather than explicit, must be supported with evidence of their essentiality.

When the response to Question 2 is written, the analyst may want to revise the response to Question 1.

III. To respond to Question III (What evidence is there that these elements are critical?), it may be necessary for the analyst to review the teacher's manual. The listing of the various methods of conveying to the teacher what elements are critical may seem unnecessary, but, as with all of these items, it is designed to lead towards greater and greater precision in specifying and supporting the essentiality of the critical elements of the model.

Teacher materials may never describe the total model in any one place. Each essential element may be introduced and explained as it is encountered. What to look for to find how the developer informs the teacher about each element is a prescriptive statement (e.g., "be sure to do the following," "always...," "in such a case, remember to...").

Sometimes the prescriptive statements are made to the student (e.g., "when you correct your test, if this...then this..."). They will have to be translated into something like the following: Self-evaluation and subsequent prescription based on it are essential elements of the curriculum. This means that if the teacher refuses to permit students to evaluate their own tests and make their own prescriptions, the curriculum will not achieve the goals to which it aspires.

IV. The fourth question in this instrument (Is further in-service instruction necessary or advisable?), is based on the previous three, in part. That is, if the model is clear, the response might well be that in-service instruction is not necessary. If it is still fuzzy or if the critical elements identified seem to be in conflict with the philosophy or customary professional style of one or more teachers who will be implementing it, it may be wise to consider in-service instruction to bolster the support for the model prior to attempting implementation.

V. Either linker or LAT member will know, better than any external analyst, those who must implement any selection. The fifth question seeks to build on this knowledge by requesting recommendations for experiences which would impress upon teachers the critical nature of these elements of the model. For some teachers, citations and explanations of research in support of these elements, either in writing or delivered by an expert in a workshop situation, would be most convincing. For other teachers, simulations of actual classroom situations to demonstrate the effect of not attending to these elements might be more persuasive. Again, there might be teachers who would prefer to hear narratives of cases in which the critical elements were violated--with results and cases in which they were carefully attended--also with results. This kind of information might not be available, however, in which case hypothetical cases could be used with <u>probable</u> results.

VI. The final question need not be answered by either linker or LAT member. It is listed as a reminder to linker, LAT, and SAT that all of the agencies involved in PSIP have a responsibility to be sure that no

outcome should fail to be effective because the school did not know, clearly, the model it had chosen in advance of installation. The question is: "How can the facilitator (PSIP) provide these experiences?" All of the agencies must keep lines of communication open so that if any outcome model has not been clearly and accurately defined by and/or for the adopting site, in such a way that the critical elements will not be violated, experiences will be provided by PSIP to help pinpoint those critical elements.

To demonstrate the process of taking notes whenever a critical element of the model surfaces as one analyzes a product or process, part of the description of the Self-Schedule System from the NIE Product Catalogue follows. As described previously, this system supplies a substantial amount of descriptive material and lists goals and objectives for each component and each participant role in the program. However, the quotation below will suffice to demonstrate how key words can alert the analyst to critical elements of a curriculum or a system.

"Under the Self-Schedule System, children pick up their prescribed assignments at the beginning of each activity session (either a 1 day or a ½ day) and understand that they must accomplish the prescribed tasks during the course of the session. They may, however, work on the tasks in any order they choose. Under this system, at any given time children can be found working in virtually every area of the classroom, with the teacher circulating among them. Small groups of children can be called together for group activities - for example, a group reading lesson - whenever the teacher wishes. Children can also form groups of their own for exploratory games or other activities. When the group session is over, children can return easily to their previously interrupted activities or to new ones.

The teacher's role involves guiding and providing proper environmental support for the student. These functions are critical to the successful operation of the system. The "how to" aspects of carrying out the teacher role are provided in a detailed teacher's manual."

With key words underlined, the notes the analyst would make after reading this paragraph probably would look something like this:

System Model - possible critical elements - first listing:

Student:

1. Prescribed assignments.
   (must accomplish during session)
2. Choose task order.
3. Can form groups.

Teacher:

1. Role involves guiding and providing proper environmental support for student.
   (critical functions)
2. May group whenever (s)he wishes.

Note that the key words fall into two major groups. The most important group designates invariant tasks, roles, rules, etc. These are such words as prescribed and must. The second group involves allowed variations. These are such words as choose, can, may. Qualifying words are also helpful because they may specify how important elements are such as "critical" as applied to teacher functions in the above paragraph. Another such word is "whenever" in the above paragraph specifying that there is no limitation on teacher's option to form groups.

The analyst inevitably will have a very long first list of identified elements in his or her first few attempts at analysis. However, after discussion with other members of the program analysis or selection team, the list can be very quickly curtailed as the elements that are in the same class are combined into a single category of critical elements.

The process of defining the model is a very important learning experience and one that the author of this manual feels confident is crucial to successful adoption/adaptation and to both effective and enduring implementation of innovative products or processes.

Conclusion

Four constructs which incorporate dimensions that seem to make a difference in student achievement have been used to organize questions for intrinsic analysis of curriculum products or processes. These questions examine the quality of the dimensions under each construct: opportunity, motivators, structure and instructional events. In addition, the process of performing the analysis provides an opportunity to identify critical elements of the product or process being analyzed.

The instruction in procedures for performing an intrinsic analysis using these instruments is the substance of this manual. This instruction consists of explanations, examples and step-by-step procedures, with supporting research references in the appendix.

There are several component skills required to carry out the necessary analysis procedures. Some of these skills are quite specialized and the description of procedures may not give the novice analyst the confidence to apply them. They should be rehearsed in a hypothetical situation before they are applied on the analysis of a curriculum product or process. Therefore, a series of practice exercises are provided on the following pages. An answer key follows the exercises with suggested appropriate responses.

Exercises

Much of the knowledge and many of the skills required for performing an intrinsic analysis normally are part of the teacher's repertoire and beyond the scope of this manual. What is more, teachers use this knowledge and these skills daily in making decisions about teaching activities. However, they seldom analyze their present materials or select new materials in any systematic way.

Intrinsic analysis instruments and procedures, as supplied by this manual, are necessary to provide a framework for the systematic examination of materials to make present materials review and new materials selection more rational processes.

Among the analysis skills which teachers may be expected to have are the ability to judge the appropriateness of materials for their student populations and to recognize adaptiveness to individual differences, variety of activities and format and provision for self-management. Teachers can be expected to recognize adequacy of teacher support in manuals and student materials and efficiency of the management system. To use these skills, then, the rationales, descriptions, examples, instruments and step-by-step procedures are sufficient assistance.

There are, however, a few skills involved in performing a comprehensive intrinsic analysis which not all teachers will have acquired. The exercises which follow are designed to provide a self-check on skills in performing these less familiar procedures. The answer key at the end of the exercises makes it possible for the analyst to spot any of his or her problem areas.

One way these exercises can be used is for helping program analysis or selection team members to identify the role they will take in the actual analysis process after completion of the training manual. Tasks may be assigned in such a way that each task is performed by at least two people, one of whom is confident in his or her ability to carry out all of the required procedures. This teaming of analysts will give the less confident team member the peer support needed to acquire those skills in which he or she is weak, through supervised practice.

These exercises are without directions in order to simulate the real analysis situation when the analyst is confronted with all the materials of a program and must judge them along the dimensions taught in this manual. Each of these selections is chosen because it represents an example of instruction or instructional directions which have been characterized previously in the manual. You may prefer to check your response to the first item in the answer key that follows on page 84.

1. Teacher manual information:

Teachers often look through the text for remedies to problems. However, if the teaching is a system, then it is impossible to skip about and have the system work. While the order of presentation here is not the only possible order, it is not possible to introduce another order without rewriting the series.

Therefore, the teacher must use the lessons in the order presented. You may go back to reteach, but you may not go forward, skipping steps between. You may add things, only if absolutely necessary and then, only with great caution, because it is difficult to unlearn incorrect generalizations. (Paraphrased from The Roberts English Series, NY: Harcourt, Brace, World, 1966).

2. The reading program, in its rationale describes its academic games that children enjoy, some similar to scrabble and some that are ball games for teaching spelling and arithmetic. Then it recommends that

the children be allowed to play them to develop their interest so they will find the more traditional arithmetic and spelling drill that follows less distasteful.

3. The students are learning to do long division. The strategy is to teach them by giving them a long division problem solved with only the last step, the remainder, to be found. Then the student does the last two steps, the last three steps, etc. in consecutive order. The problem is presented to the student correctly solved up to the steps left for the student to do.

4. Directions to the teacher:

Have the children clap once as you say, fast, twice as you say faster. Then pronounce each word carefully so both syllables can be heard. (farm, farmer; start, started) as the children clap have them decide whether it is a one or two syllable word:

damper	hunter	pepper
dump	hunted	into
mend	dart	hand

Have the children write h on the chalkboard. Have the children repeat after you.

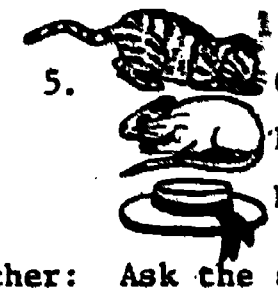
hot	hole
hat	hem
hate	hitch
hit	happy
high	honey

Have children give rhyming words beginning with h, explaining that rhymes are words that sound alike except at the beginning like Jill and hill, sled and bed.

Teacher says word - child says rhyming word:

top (hop)	rope (hope)
sit (hit)	corn (horn)
fat (Hat)	mail (hail)
fold (hold)	roam (home)

(Paraphrased from Basic Reading, NY: Lippincott, 1963)



	1	2	3	4
5.	CAT	- CAT	- _AT	- C_T
	RAT	- RAT	- _AT	- R_ _
	HAT	- HAT	- _AT	- H_ _

Teacher: Ask the student to complete columns 2, 3 and 4. Explain s/he must follow the dots in column 2, fill in the first letters in column 3, follow dots and fill in blanks in column 4.

6. Rationale:

At the early levels of this program, illustrations are used for an additional context for the printed messages. The children learn to use pictures to verify the predictions they make from the print. As children move through the levels, the picture to print ratio diminishes.

7. Composition - Grade 3:

1. Keep the lesson entirely oral.

2. Write on the board the words <u>familiar situation</u> - <u>getting ready for school</u>.

3. Use free discussion, encouraging student to tell what their sensory experiences are as they prepare for school. What do they see, hear, feel, smell?

4. Do not write down ideas but concentrate on receiving as many ideas as possible in 10 to 12 minutes.

(Teacher directions continue with exercises involving just sight, then other senses one at a time in subsequent lessons. Finally, have the students write single words with modifiers on some given familiar situation.)

8. Student directions:

1. Below are four pairs of statements. Read them.

   a. Clouds are formations of condensed water.
      Clouds are like puffs of cotton.

b. The United States is committed to giving military assistance to many countries.
The United States is a fortress guarding against the assaults of tyranny.

c. A song consists of words which are recited in rhythmic patterns to the accompaniment of music.
A song is like an angel's sigh.

d. A dog is a four footed, domesticated, carnivorous mammal.
A dog is man's best friend.

2. Now, choose one pair of sentences and write two brief paragraphs beginning each with one of the sentences in the pair you have chosen. Then, compare the two paragraphs you have written and answer this question: How did the point of view taken in the first sentence of each paragraph determine what you could add? (Paraphrased from Postman: Exploring Your Language, Holt, Rinehart and Winston, NY, 1966.)

9. From the teacher's manual:

Discrete examples of concepts differ widely in nonessential features such as shape, size and color (if these are nonessential).

10. Rationale:

The authors of this program believe that the basic facts taught in second grade should be presented by the same direct method, not indirectly, and that the goal should be to know them to the point of immediate recall.

Student materials:
If 4 + 6 = 10 and 1 more than 4 = 5
then 5 + 6 = 1 more than 10 or 11.

11. The student worksheet shows three columns of pictures of different sizes and shapes of different colored containers labeled pints or quarts. The directions tell the teacher to ask the students to decide whether the pictures in each row hold an amount equal to, less than or greater than the amount the top row of containers hold and then draw a ring around the

correct group of words (equal to, less than, or greater than) written at the side of each row.

12. The following is a portion of the objectives of a math curriculum for early elementary school children:

The student should be able to:
read a list of telephone numbers
tell his/her home phone number
dial a telephone number
read a calendar
circle the day's date on the calendar
write the day, month and year
read a thermometer
write the temperature of the room
using play money, count it
simulating purchases, pay and
count change.
(and others in the same vein)

13. For kindergarten children, teacher directions:

Have the children follow two step directions, such as "Get up from your seat and close the door (or open the door)." After the students have mastered this, follow it with three-step directions. "Get a piece of red paper, get a pair of scissors and cut the paper in half." Some kindergarten children can go on to follow four step directions after mastery of three.

14. Teacher directions:

GUIDANCE CHART FOR LETTER SOUNDS

YOU WILL LEARN TO READ A NEW SOUND.
THE NAME OF THIS LETTER IS... (Pupil Response)
WHAT IS THE NAME OF THIS LETTER?
THIS LETTER MAKES THE SOUND/__/.
SAY /__/.
WHAT SOUND DOES THIS LETTER MAKE?

SPELL AND READ THIS SOUND.

(Remove model) WRITE, SPELL, AND READ.

(Show model) PROOF AND CORRECT.

WHAT LETTER MAKES THE SOUND /__/?

(Remove model) SPELL AND SAY. LOOK AT ME (Delete "LOOK AT ME" when behavior is established.)

NOW, LET'S PUT THIS CARD WITH OTHER CARDS OF THE SOUNDS WE KNOW AND PRACTICE THEM.

Practices with flashcards

READ THE SOUND OF THE LETTER WHEN MY FINGER TOUCHES THE CARD.

READ THE SOUND AS MANY TIMES AS YOU CAN UNTIL MY FINGER COMES OFF THE CARD.

I WILL PUT THE LETTER "_" WITH OTHER LETTERS YOU HAVE LEARNED. READ ONLY THE SOUND /__/ WHEN YOU SEE THE LETTER "__". (Use only when limited number of letters have been learned.)

READ THE SOUND OF EACH LETTER.

READ THE SOUND OF EACH LETTER __ TIMES.

READ THIS SOUND AND HOLD IT AS LONG AS MY FINGER IS ON THE CARD. (For continuant consonants only.)

Practice in written exercises

WRITE, SPELL AND READ ALOUD THE LETTER THAT MAKES THE SOUND /__/ AS MANY TIMES AS YOU CAN UNTIL I SAY "FINISH." THEN FINISH THAT LETTER AND PUT YOUR PENCIL DOWN. "FINISH."

WITH YOUR FINGER UNDER EACH LETTER, READ THE SOUNDS OF THE LETTERS YOU WROTE.

(From Exemplary Center for Reading Instruction, ECRI, Salt Lake City, Utah)

15. Student objectives:

a. Identifies calendar units, # days in week, # days in each month. Completes claendars. Word problems. Writes given date in words and numbers or in numbers.

b. Reads any time on clock face using hour and minute hands. Shows any time using clock face. Writes and reads time using appropriate vocabulary and punctuation.

c. Finds minutes elapsed between 2 minute hand readings. Limit 2 hours. Calculates passage of time.

d. Solves problems adding/subtracting hours/half hours on clock face.

e. Adds/subtracts time units. One step problems. No regrouping. Limit 2 ½ hours.

f. Solves problems in reading bus, train, plane schedules.

g. Addition/subtraction 2-3 time units. 1-2 regroupings. Seconds through years.

16. The following is a list of objectives, each of which is followed by a test item for that objective:

a. The student should be able to comprehend and interpret the reading materials assigned to him/her.

Test items:
The short story, "Gift of the Magi" is assigned to be read and the following questions to be answered:
What was the relationship of the two principal characters?
What was the surprise ending?
Why did it happen?
How do you think the man and woman felt about their gifts?

b. The student should be able to select library books that are of interest to him.

Test item:
Below is a list of fiction and non-fiction books at your reading level that are available in the school library. Please indicate by a check mark those you would find interesting and write one sentence for each book checked saying why you checked it.
(List follows)

c. The student should be able to define the following words: noun, pronoun, adjective, adverb.

Test item:
Below are four words and four definitions. Match the words to the definitions by drawing lines between them.
(There follow the four words in one column and the mismatched four definitions in the other.)

d. The student should be able to find the area of a rectangle.

Test item:
The table is 5 feet long and 4 feet wide. What is the area of the table?

Answer Key to Exercises

1. This indicates that sequence is a critical element of the model. This is a linguistics program and these two paragraphs are clear evidence that sequence must not be changed. Note the imperatives "must," "may not," "only" which show that the only possible sequence adaptation is to reteach when necessary. Even supplementation is discouraged.

2. This appears to be an attempt to use games to motivate. However, it is an inappropriate instructional strategy (instructional event) because the order should be reversed. The behaviorist Premack principle suggests that higher probability behavior will reinforce lower probability behavior. Therefore the drill should precede the games with the latter promised as a reinforcement of the lower probability behaviors.

3. This is an appropriately used instructional strategy (instructional event). It is an example of backward chaining which reinforces the student with a correct answer as he proceeds. It is also an example of successive approximations since each step is an approximation of the desired terminal behavior of solving a long division problem.

4. This is an example of direct instruction. The students are kept on task by their active participation, clapping, repeating aloud and contributing rhyming words.

5. This is an example of the use of cues (the pictures and the dotted lines). It is also a small step procedure. Both strategies are used correctly.

6. The strategy described here is fading. The pictures are cues which are gradually faded as the instruction progresses. This has implications

for the instructional model, also. It happens to be a learning experience program and the pictures are a part of the means by which children are enabled to experience language quickly through context. The pictures, therefore, are a critical element of the instructional model and varying the order might undermine the strategy.

7. This is use of successive approximations. It is carefully structured in small steps. It is motivating because it appeals to students' personal experiences. It is concentrated intense treatment. (Note the caution "Do not write down ideas." This would cause delay and the possibility of inattention.)

8. This is an excellent example of the discovery method. The student discovers for himself or herself how significant the tone of a topic sentence can be. It is extremely well designed.

9. Appropriate concept teaching strategy to help the student discover the critical attributes of the concept.

10. If this example actually had appeared in materials which claimed the philosophy expressed, they would be thoroughly inconsistent. The theory supports memorization of the number combinations.

This is very intense treatment. The students have to convert pints to quarts, read the words and demonstrate understanding of the concepts greater than, less than and equal to. For appropriate structuring, this lesson would have required the mastery of prior objectives for the concepts pint and quart and prior objectives for the concepts greater than, equal to and less than. The analyst should ascertain that these concepts were taught. If they had been taught, it would be a good lesson.

12. This would be a good example of the functional use of numbers (motivators).

13. This is a small steps strategy and the last sentence indicates an attempt to individualize instruction on the basis of diagnosis of each student's development.

14. This is very direct instruction. It is teacher guided. The students are kept strictly on task. In addition, it employs a strategy of using all the senses. The showing of the model for proofing and correcting provides immediate feedback. The exercise includes timed practice. The procedure of watching the teacher is a modeling strategy which also is a prompt that is faded when the behavior is established. All the strategies employed are used appropriately.

15. This sequence on time has two major gaps in it. There is no provision for learning morning, afternoon, night and for dividing the day at noon and midnight and learning to write A.M. and P.M.

There is no provision for identifying the second hand, reading seconds and learning how many seconds there are in a minute.

16. a. The test items for this objective are appropriate. The literal questions test the comprehension part of the objective and the interpretive questions test the interpretive part of the objective. It does not require great skill to interpret this particular story, so the questions are simple and straightforward.

b. This test item is inappropriate. The objective is to select. A selection process goes beyond reading a title. It may be influenced by the table of contents, illustrations, the brief cover overview, etc.

The justification of the selection was not part of the objective and would be an unrealistic task on the basis of title alone.

c. To define means just that. It does not mean to recognize a definition. Also, in matching questions it is better not to have an equal number of items.

d. This test item matches the objective.

Intrinsic Analysis Instrument

Part 1

Student Materials, Inservice Materials, Parent Materials (SIP form)

Preparation and previewing of materials is the first step before analyzing them along the following dimensions.

I. Opportunity (substance):

A. Are the activities, content and concepts appropriate for the student population so there is opportunity to learn?

1. Are the activities appropriate for the developmental level and socio-economic characteristics of the students?

2. Is the content relevant to these students?

3. Are the concept examples provided relevant to the student's experience, needs, stage of instruction, so conceptualization can occur?

Quality rating of activities on the basis of AI, 2, 3,: ____

(1 excellent; 2 good; 3 fair; 4 poor)

Opportunity (usage)

B. Do the materials teach in a clear, focused, concentrated way and adapt to individual learning differences?

1. Do the materials supply concentrated cognitive activity for the student (parent, teacher) to assure adequate opportunity to learn?

2. Do the materials provide the opportunity to learn for both slow and fast students and do they provide for different learning styles?

Quality rating of intensity of treatment and adaptiveness on the basis of B1, 2. ____

(1, excellent; 2 good; 3 fair; 4 poor)

II. Motivators:

A. Is there an opportunity for student (parent, teacher) self-direction, selection, evaluation?

1. Does the student (parent, teacher) select instructional activities?

2. Does he or she plan his/her program?

3. Does he/she have an opportunity for self-evaluation?

Quality rating of motivators on the basis of A1,2,3 ____

(1 excellent; 2 good; 3 fair; 4 poor)

B. Do the materials provide reinforcement or do they instruct the teacher how and when to do so?

1. Do the materials provide reinforcement?

2. Do the materials provide feedback?

Quality of reinforcement based on B1, 2. ____

(1 excellent; 2 good; 3 fair; 4 poor)

C. Is there sufficient variety in the materials to appeal to student interests?

1. Is there variety in method, mode, format, and instructional strategies?

2. Are there alternative paths through the materials to accommodate individual differences?

3. Is content appealing to a range of interests?

4. Are materials functional, related to life experiences?

Quality of variety on the bases of C 1-4 ____

(1 excellent; 2 good; 3 fair; 4 poor

III. Structure:

A. Are there specific expressed instructional objectives or clearly implied objectives on which the instruction is based?

1. To what degree does the instruction teach to the objectives?

Quality rating of objectives on the basis of A 1, ____

(1 excellent; 2 good; 3 fair; 4 poor)

B. How well are the objectives structured and sequenced to build towards the terminal goals

1. as indicated by a concept analysis? (sampling)

2. as indicated by a content analysis? (sampling)

3. as indicated by a skill analysis? (sampling)

Quality rating of sequencing on the basis of B 1, 2, 3 ____

(1 excellent; 2 good; 3 fair; 4 poor)

C. Is there a testing procedure adequate to determine mastery of the objectives.

1. How well do the test items, observation guidelines or other mastery criteria match the implied or explicit objectives?

2. Are all objectives, stated or implied, measured or checked by observation and are criteria provided?

   a. Affective?

   b. Cognitive?

   c. Psychomotor?

   Quality rating of testing on the basis of C 1, 2: _____

   (1 excellent; 2 good; 3 fair; 4 poor)

D. Does the instructor's manual provide guidance for diagnosis and remedial treatment?

1. How adequate are the props which the instructor's manual provides to guide the teacher in diagnosis of student needs and for placement and progression?

2. How adequate is the guidance supplied by the teacher's manual for alternate, remedial or supplemental instruction for students?

3. To what degree do the range of the objectives alone or the objectives combined with the remedial or supplemental instruction match the range of the student population?

   Quality rating of guidance for diagnosis and treatment on the basis of D 1, 2, 3, _____

   (1 excellent; 2 good; 3 fair; 4 poor)

IV. Instructional Events (Substance):

A. Does the teacher's manual (in-service or parent materials) furnish sufficient teaching assistance?

1. Information on methods?

2. Information on strategies?

3. Background information, vocabulary (definitions of terms) and procedures?

Quality of teacher props on the basis of A 1, 2, 3, ____

(1 excellent; 2 good; 3 fair; 4 poor)

B. Is the quality of instruction in student materials consistently high?

1. Content quality?

2. Concept quality?

3. Skill quality?

Quality of teacher props on the basis of B 1, 2, 3, ____

(1 excellent; 2 good; 3 fair; 4 poor)

C. Is the management system efficient enough to support the quality of instruction?

1. Can students work steadily without delay or threat to the effectiveness of instructional events?

2. Can teachers manage instruction without frequent breakdowns in the system?

Quality of management system on the basis of C 1, 2, ____

(1 excellent; 2 good; 3 fair; 4 poor)

Instructional Events (usage)

D. Are the instructional strategies and methods appropriate for this student population and are they used effectively?

1. Appropriateness of strategy selection and usage?
2. Appropriateness of methods selection and usage?

Quality of instructional strategies and methods based on A 1, 2 ____

(1 excellent; 2 good; 3 fair; 4 poor)

Intrinsic Analysis Instrument

Part 2

Management Systems, Practices or Processes (MPP form)

I. Opportunity:

A. Does this system or practice provide more time for learning?

1. To what extent does the system or practice give the student more on task time?

2. To what extent does the practice or system give the teacher more time to actively teach (direct instruction) or guide student learning?

Quality rating of opportunity on the basis of 1, 2, ____

II. Motivators:

A. Does this system or practice offer advantages to both student and teacher which will encourage cooperation in implementing it?

1. To what extent does it save the teacher time and/or effort?

2. To what extent does it help the teacher teach more effectively?

3. To what extent does it help the student spend more active time in learning what he/she finds interesting?

Quality rating of motivators on the basis of 1, 2, 3 ____

B. Does this system or practice provide the student with more independence in managing his own learning?

1. To what extent does the student have a chance to select his own topic, reading, activity, etc.?
2. To what extent does he have a chance to correct his own work, decide when he is ready to go on to a new activity?
3. To what extent is he/she permitted, encouraged, to plan his/her own time?
4. Is the student allowed to work with his/her own friends, tutor or be tutored or otherwise interact, cognitively, with peers?

Quality rating of motivators on the basis of 1, 2, 3, 4 ____

III. Structure:

A. Are there specific process objectives (i.e., student self-management, learning-to-learn, maximal use of expertise by team teaching, etc.)?

1. To what degree do the objectives match the identified problems in the target school?
2. To what degree are adequate instruction and/or explicit directions provided for the user of the system, process?
3. To what degree do the demands of the objectives match the capabilities of the students and teachers and the constraints of their environment?

Quality rating of structure on the basis of 1, 2, 3 ____

IV. Instructional Events:

A. Does this system or practice permit the teacher more time to plan and carry out carefully selected instructional strategies appropriate for these students?

1. To what extent does the system relieve the teacher of management, clerical duties?
2. To what extent does the system itself incorporate use of effective instructional strategies?
3. To what extent does the system permit and encourage creative teaching (beyond what is prescribed) by suggestions, example, instruction, etc.?

Quality rating of instructional events on the basis of 1, 2, 3 ____

Intrinsic Analysis Instrument

Part 3

Analysis of the Curriculum Model or the Instructional Management Process

I. What are the critical elements of this model? (implicit or explicitly specified by the developer)

II. What evidence is there that these elements are critical?

III. How do the teacher materials inform the teacher of the essentiality of these specific model components?

IV. Is further in-service instruction necessary or advisable?

V. What kind of experiences are likely to impress upon the teacher the critical nature of these elements?

VI. How can the facilitator (PSIP) provide these experiences?

Intrinsic Analysis Instrument

Long Form[1]

Student Materials, Inservice Materials, Parent Materials (SIP form)

Preparation and previewing of materials is the first step before analyzing them along the following dimensions.

I. Opportunity (substance):

A. Are the activities, content and concepts appropriate for the student population so there is opportunity to learn?

1. Are the activities appropriate for the developmental level and socio-economic characteristics of the students?

a. Are all written explanations and directions for students simple, uncomplicated, straightforward and easy for this age level to understand?

b. Is the objective of each task assignment expressed clearly for the student to know explicitly what s/he must do, how well? If it is not clearly expressed, is it very obvious from the wording what behavior is expected and the level of performance required?

2. Is the content relevant to these students?

a. Does the content relate closely enough to the student's own knowledge and experiences to build on them? Does it offer enough new information to provide opportunity to learn that can be related to what is already known?

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[1]There is no long form for the process part of the instrument (Part 2, MRP form) or the curriculum model or instructional management process form (Part 3).

b. Is there content (i.e., facts, information, events, people) that you deem essential, which is left out?

3. Are the concept examples provided relevant to the student's experience, needs, stage of instruction, so conceptualization can occur?

a. Is there instructional material available to teach essential concepts, written in vocabulary at the level of the lowest student? Has some of the instruction been planned to challenge the most advanced student?

b. Are concept instances selected so that early in instruction they have few irrelevant attributes (or characteristics that are not the essential defining characteristics of that concept class)?

Are concept instances, late in instruction selected which have more irrelevant attributes and hence are more difficult to recognize as examples of the concept?

c. Are there concepts (i.e., classes of things that are the important organizing centers of a subject) which you consider essential that are left out?

Quality rating of activities on the basis of A1, 2, 3,: _____

(1 excellent; 2 good; 3 fair; 4 poor)

Opportunity (usage)

B. Do the materials teach in a clear, focused, concentrated way and adapt to individual learning differences?

1. Do the materials supply concentrated cognitive activity for the student (parent, teacher) to assure adequate opportunity to learn?
   a. Is there opportunity provided to learn each expressed or implied objective?
   b. Are there enough learning activities to maximize the students' opportunities for learning?
   c. Do the materials suggest or provide sufficient direction to make possible direct instruction (i.e., teacher-directed instruction) a large part of the time?
2. Do the materials provide the opportunity to learn for both slow and fast students and do they provide for different learning styles?
   a. Are the exercises and tasks demanded of the student diverse enough so that students' different learning styles can be accommodated?
   b. Do the instructional materials supply enough practice for these students to learn?
   c. Does the management system suggested by the materials permit adaptation to individual pace?

Quality rating of intensity of treatment and adaptiveness on the basis of B1, 2: ____

(1 excellent; 2 good; 3 fair; 4 poor)

II. Motivators:

A. Is there an opportunity for student (parent, teacher) self-direction, selection, evaluation?

1. Does the student (parent, teacher) select instructional activities?

a. Have the materials taught the student or provided guidelines for the teacher to teach the student how to make appropriate selections?

b. Is there any variety in procedures for making selections to accommodate individual differences in self-directedness, complementing the teaching and/or guidelines in 1a?

2. Does he or she plan his/her program?

a. Is the student allowed to plan his/her own time without prior instruction in how to do so? How adequate are the directions for this independent kind of behavior?

3. Does he/she have an opportunity for self-evaluation?

a. Is there instruction in <u>how</u> to evaluate his/her own work?

b. Is the student eased into self-selection, self-evaluation in a step-by-step fashion appropriate to the developmental and experiential level of the student?

Quality rating of motivators on the basis of A1, 2, 3,: _____

(<u>1</u> excellent; <u>2</u> good; <u>3</u> fair; <u>4</u> poor)

B. Do the materials provide reinforcement or do they instruct the teacher how and when to do so?

1. Do the materials provide reinforcement?

   a. Does the instructor's manual provide examples of appropriate reinforcement procedures?

   b. Does the student see the objectives or are there checklists or some recognition of progress that the student can use to monitor his or her success?

2. Do the materials provide feedback?

   a. Are the directions to the teacher for providing feedback and motivators sufficiently clear and are the signals in the materials for how and when to use them sufficiently attention-getting to encourage their use?

Quality of reinforcement based on B1, 2: ____

(1 excellent; 2 good; 3 fair; 4 poor)

C. Is there sufficient variety in the materials to appeal to student interests?

1. Is there variety in method, mode, format, and instructional strategies?

   a. Are there too many activities of the same kind which might become boring to the students?

   b. Is the student allowed to tutor a peer or be tutored by a peer?

2. Are there alternative paths through the materials to accommodate individual differences?

a. Do all students move through the materials in lock-step or are there opportunities for students to have unique programs that meet their needs?

b. Where there are a variety of possible pathways and individual programs of study, are the teacher's directions adequate for effective management of this variety?

3. Is content appealing to a range of interests?

a. If I were the age of these students, would I find these materials interesting? If I were of similar background and experience as these children, would I probably enjoy working with these materials?

4. Are materials functional, related to life experiences?

Quality of variety on the basis of C1-4: _____

(1 excellent; 2 good; 3 fair; 4 poor)

III. Structure:

A. Are there specific expressed instructional objectives or clearly implied objectives on which the instruction is based?

1. To what degree does the instruction teach to the objectives?

a. Do randomly selected objectives have matching instructional materials which both teach and require demonstration of the identical behavior described by the objective?

Quality rating of objectives on the basis of A1: _____

(1 excellent; 2 good; 3 fair; 4 poor)

B. How well are the objectives structured and sequenced to build towards the terminal goals

1. as indicated by a concept analysis? (sampling)
   a. For each generalization which is a part of an expressed or implied objective are the component principle and concepts taught?
   b. For each principle which is part of an expressed or implied objective are the component concepts taught?
2. as indicated by a content analysis? (sampling)
   a. When content previously encountered is the subject matter of later instruction, are references made to the earlier instruction to help build cognitive bridges and instructional structure?
3. as indicated by a skill analysis? (sampling)
   a. Do the behaviors required of the students fall within the same taxonomy levels or are all levels of behavior sampled, when this is appropriate?

Quality rating of sequencing on the basis of B1, 2, 3: ____

(1 excellent; 2 good; 3 fair; 4 poor)

C. Is there a testing procedure adequate to determine mastery of the objectives?
   1. How well do the test items, observation guidelines or other mastery criteria match the implied or explicit objectives?
      a. Are there self-test items in end of chapter and/or end of unit, or other curriculum tests which demand the behavior expressed in the selected objectives so the students are made aware of what mastery tests will require for progression?

2. Are all objectives, stated or implied, measured or checked by observation and are criteria provided?

   Affective?

   Cognitive?

   Psychomotor?

   a. For expressed affective objectives, is there any guidance in determining how to judge whether they have been attained? Is more than one example of criterion behavior supplied in the teacher's manual or in other guidelines?

   b. When a concept is taught, is it tested by requiring the student to distinguish between examples and non examples and to generate a new (e.g., untaught) example?

   c. When a principle is taught, is it tested by requiring recall of component concepts, by requiring stating the principle and/or by asking the student to apply it, or describe cases where it would or would not be applicable?

   d. In generalizing, do students generate their own examples of the generalization?

   e. In problem solving, do students select the appropriate principle and solve the problem?

Quality rating of testing on the basis of C1, 2: ____

(1 excellent; 2 good; 3 fair; 4 poor)

D. Does the instructor's manual provide guidance for diagnosis and remedial treatment?

1. How adequate are the props which the instructor's manual provides to guide the teacher in diagnosis of student needs and for placement and progression?

   a. Is there a scope and sequence chart to provide an overall picture of the structure of the instruction?

2. How adequate is the guidance supplied by the teacher's manual for alternate, remedial or supplemental instruction for students?

   a. How readily can remedial or supplementary materials be plugged into this structure? Does some simple and feasible coding system appear to be possible for facilitating use of all available materials which can be fitted into the curriculum structure?

   b. How well does this course, as it is structured, fit into the total school curriculum in this subject, especially the immediately preceding and succeeding courses?

3. To what degree do the range of the objectives alone or the objectives combined with the remedial or supplemental instruction match the range of the student population?

Quality rating for guidance for diagnosis and treatment on the basis of D1, 2, 3: _____

(1 excellent; 2 good; 3 fair; 4 poor)

IV. Instructional Events (substance):

A. Does the teacher's manual (in-service or parent materials) furnish sufficient teaching assistance?

1. Information on methods?

   a. Do the instructions to the teacher specify whether or when the materials teach inductively or deductively? Do they indicate if a discovery, guided discovery or individual inquiry method is used? Are they used in accordance with appropriate pedagogical procedures?

2. Information on strategies?

   a. Are instructional strategies ever mentioned at all in descriptive or teacher materials? If they are not, it must be assumed that the teacher's cooperation is not required for effectiveness unless there is evidence to the contrary.

3. Background information, vocabulary (definitions of terms) and procedures?

   a. When the materials require an introduction by the teacher or a synthesis, is the required information supplied for him or her or must the teacher supply it?

   b. In presenting any information to the teacher on methods or strategies, are all terms defined and all procedures described?

Quality of teacher props on the basis of A1, 2, 3: _____

(1 excellent; 2 good; 3 fair; 4 poor)

B. Is the quality of instruction in student materials consistently high?

   1. Content quality?

a. Does the teacher who will teach from these materials feel that the content is what should be taught in this subject to these children? What do the experts say the issues are? Taking these issues into consideration is this the content you would choose?

2. Concept quality?

a. Are these the concepts scholars in the field recommend should be taught to children at this stage of their development?

3. Skill quality?

a. In order to teach the children learning-to-learn skills, are all taxonomic levels sampled in these materials?

Quality of teacher props on the basis of B1, 2, 3: ____

(1 excellent; 2 good; 3 fair; 4 poor)

C. Is the management system efficient enough to support the quality of instruction?

1. Can students work steadily without delay or threat to the effectiveness of instructional events?

2. Can teachers manage instruction without frequent breakdowns in the system?

Quality of management system on the basis of C1, 2: ____

(1 excellent; 2 good; 3 fair; 4 poor)

Instructional Events (usage)

D. Are the instructional strategies and methods appropriate for this student population and are they used effectively?

1. Appropriateness of strategy selection and usage?

   a. If the materials claim to use certain instructional strategies, do they also tell how they are used so you can judge the appropriateness of selection and usage?

   b. Following are some instructional strategies that you might want to check for and to ask yourself: Are they appropriate here and are they used correctly?

      small steps
      cues and prompts
      questions distributed through instructional materials (rather than only at the end)
      advance organizers
      backward chaining
      concept-learning strategies based on range of instances
      subject area specific strategies such as modeling in blending
      practice
      reinforcement
      feedback

2. Appropriateness of methods selection and usage?

Quality of instructional strategies and methods based on D1, 2: _____

(1 excellent; 2 good; 3 fair; 4 poor)

Steps in Performing an Intrinsic Analysis

Preparation and Previewing:

A. Assemble and read carefully each of the following which is available to you:

1. Advertising materials and any available developer's descriptions, rationale or scholarly papers on the program or process.

2. The Introduction to the Teacher's Manual, Resource Books or Teacher's Edition (Except when articulation appears to be a problem, one level is enough to examine. However, each member of an LAT may choose a different level to provide a broader perspective.)

3. Any already completed analyses (e.g., EPIE, CMAS, etc.)

B. Answer the following questions, for which these above sources <u>may</u> provide information. (The claims in these assembled materials can be checked for accuracy in the analysis of the materials themselves, later in the analysis process). Use your professional judgment to decide on the appropriate response.

1. Are the content, concept and skill <u>emphases</u> the appropriate ones for this school (teacher, student population)?

2. Does the instructional method used in these materials match the philosophical and theoretical orientation of this teaching staff?

3. Are the available curriculum components sufficient for your staff and can those that are necessary be fit into the budget? (e.g., clear chart of scope and sequence, teacher resource books, tests, supplementary materials.)

4. Are there any constraints or criteria, identified by the LAT, which these materials fail to meet?

If responses to any of these are negative (in spite of PSIP prescreening) you may want to eliminate this outcome from consideration for adoption.

C. Select the appropriate intrinsic analysis instrument (i.e., the student, inservice, or parent instrument; or the management systems, practices or processes instrument) and read it over before beginning to use it to guide your work.

I. Opportunity (SIP form)

A.1. Assemble and examine, as needed to respond to instrument questions, any of the following that are available:

scope and sequence charts
lists of course objectives
sampling of lessons, preferably scattered throughout the materials.
the tests which follow closest to these lessons (which may be lesson tests, or curriculum embedded tests, or unit tests),

2. Answer the questions in the analysis instrument under opportunity (substance).

3. Rate the substantive quality of the materials for opportunity, based on your responses to these questions.

(If each question rates a 1, the quality rating should be 1, of course. If any one question rates a 4, "poor", you may consider giving the whole dimension a 4 rating. If there is no "poor" rating, you may prefer to average the scores. It is impossible to quantify evaluation of these curriculum elements and the ratings must be used as they are intended, only as a means of helping the analyst to retain and record his or her overall impression of each of several critical dimensions of the curriculum).

4. If you are comparing curricula, enter your ratings for each question on the products selection chart.

B.1. Using the same materials assembled for A, with the addition of student and class record forms, examine as necessary and answer the questions in the analysis instrument under opportunity (usage).

2. Rate the teaching in relation to the opportunity construct by the intensity of treatment of the lessons, clarity of objectives, criterion referencing of the tests to the objectives, and facilitation of on-task behavior by the management system.

3. Rate the lessons on the degree to which they are adaptive enough to provide an opportunity to learn for all students, regardless of their individual learning characteristics.

4. Rate the usage quality of the materials for opportunity, based on your responses to these questions.

5. If you are comparing curricula, enter your ratings for each question on opportunity, usage, on the products selection chart.

II. Motivators

A.1. Lay out all the instructional materials available to you for review. These will be used for spot checking and overall skimming. For more intensive study, set aside a sampling of student materials (texts, workbooks, record forms etc.) and the teacher's manual.

2. Using the student's instructional materials and record forms and the directions to the teacher on the conduct of class activities, determine the degree of self-direction, selection and evaluation permitted and/or encouraged by the curriculum.

3. Respond to each question in this category and write a quality rating for it.

B.1. Examine directions to the teacher in the teacher's manual to determine what is suggested for reinforcement and feedback to students. Identify, also, the amount of reinforcement and feedback buidt into the student materials.

2. Respond to each question and rate the materials on quality of reinforcement and feedback.

C.1. The total range of materials should be skimmed to observe the degree of variety they provide.

2. The questions on motivation through interest, functional use and variety should then be answered and a rating on this dimension of motivation should be made.

3. If curricula are being compared, a rating for each question under motivators should be entered on the products selection chart.

III. Structure

A.1. Assemble the following:

a sampling of lessons and tests (preferably different ones from those already used since the more portions of the curriculum you examine, the better your chances of uncovering any inadequacies if such exist.)

a scope and sequence chart, or a list of all the objectives for the course.

the teacher's manual.

2. examine and rate the match of instruction to objectives.

B.1. Do a concept analysis, using the scope and sequence chart and selected lessons.

2. Do a content analysis using the scope and sequence chart or list of objectives.

3. Using the scope and sequence chart again, or list of objectives, and selected lessons, do a skill analysis.

4. Rate the sequencing on the basis of your analyses of content, concepts and skills.

C.1. Examine a sampling of related objectives, lessons and tests to determine the adequacy of their match.

2. Check a sampling of objectives (choosing some from each domain - cognitive, affective, and psychomotor) to determine whether tests or teacher observation directions are provided for judging their attainment.

3. Rate the testing procedures.

D.1. Examine the instructor's manual, looking for the guidance provided for diagnosis of students' present abilities for placement.

2. Look for the clarity of the instructions to the teacher on when and how to determine each succeeding assignment and what to do if the student fails to master an objective.

3. Determine whether the suggestions for and provision of remedial and/or supplemental instruction meet the needs of all students in your school so each is provided a structured instructional plan building toward the terminal goals of the program.

4. Rate diagnoses and remediation on the basis of your responses to these questions.

5. If you are comparing curricula, enter ratings for each question under structure on the product selection chart.

IV. Instructional events

A.1. Assemble and examine, as needed, the following:
teacher's manual
a sampling of student lessons.
management system record forms.

2. Determine the adequacy of the assistance provided for the teacher in providing information on methods, strategies, procedures, and additional background information.

B.1. Evaluate the quality of the content, concepts and skills taught by these materials.

C.1. Determine the efficiency of the management system in facilitating effective instructional events by responding to questions C.1, 2.

2. Enter a quality rating for instructional events (substance)

A.1. Examine the teacher materials and students lessons to determine whether the strategies and methods are both appropriate for these students and appropriately used and respond to each question under this category in the instrument.

2. Enter a quality rating for instructional events (usage).

3. If you are comparing curricula fill in ratings for the instructional events questions in the product selection chart.

Steps in Performing an Intrinsic Analysis

Management Systems, Practices or Processes (MPP form)

Preparation and Previewing is a first step, as in the use of the SIP form. The two items, B1 and 2 should read, for this MPP form, as follows:

B1. Is the management system, practice or process appropriate for this school, these teachers and students?

2. Does the instructional practice or process match the philosophical and theoretical orientation of this teaching staff?

I. Opportunity

A.1. Assemble and examine, as needed to respond to the questions in this instrument, any of the following that are available:

student and class record forms
teacher manuals and/or other directions to the teacher on the system, practice or process
any in-service training descriptions or materials
rationale or other description and theoretical background for the system, practice or process
any objectives of the system, practice or process that explicitly indicate its goals
directions to students.

2. Answer the questions in the analysis instrument under opportunity.

3. Rate the opportunity which this system, practice or process provides for learning in the form of more on task time for students, and direct instructional time and active guidance of learning by the teacher.

4. If you are comparing systems, practices or processes, enter your ratings for each question on the selection chart, process.

II. Motivators

A.1. Using the same materials already assembled, examine them and answer each question under the construct, motivators, related to the advantages provided student and teacher.

2. Rate the motivators that are based on saving of teacher time and effort, help for the teacher in teaching more effectively and help for the student in active learning time of interest to him or her.

B.1. Answer the questions under motivators related to self-management provisions of the system, practice or process.

2. Enter a quality rating for student self-selection, self-evaluation, independent planning and freedom to interact cognitively with peers.

3. If you are comparing systems, practices or process, enter your ratings for each question on the selection chart, process.

III. Structure

A.1 Among the artifacts you were asked (above) to assemble, if available, were objectives of the management system, practice or process. If there are no explicit objectives, they must be inferred from the descriptive materials and rationale. It would be helpful, if you are dealing with objectives the developer has implied, rather than explicitly stated, if you would list them for your use in responding to the questions under the construct, structure.

2. Answer each of the questions under structure to identify the degree of match of the objectives to the problem(s) the school wants to work on and to the capabilities of students and teachers and constraints of the environment. Also to be identified is the degree directions and/or instructions are provided for the user of the system practice or process.

3. Enter a quality rating for your analysis of the degree of structure made available by this system, practice or process through its provision of appropriate objectives and how-to-do-it information for structuring the system.

4. Enter your ratings on the process selection chart, if appropriate.

IV. Instructional Strategies

A.1. Using, again, the artifacts required for sections I, II and III, examine them to determine whether or not they assist the teacher in the planning and execution of appropriate instructional strategies.

2. Respond to the question on the degree to which the system relieves the teacher of clerical and management duties (if it does so at all).

3. Respond to the questions on the system's use of effective instructional strategies and the encouragement, instruction or examples it provides the teacher for generating his or her own effective strategies.

4. Enter a quality rating for appropriateness of instructional strategy assistance provided by the system, practice or process.

5. For comparison during selection, enter ratings on the process selection form.

Selection Chart (Products)

STUDENT MATERIALS → / ELEMENT ANALYZED: ↓	Outcome A	Outcome B	Outcome C	Outcome D
I. Opportunity (substance):				
Content/Concepts/Skills				
appropriate skill level sampling				
content relevance to student				
appropriate concept instance range				
Opportunity (usage):				
intensity of treatment				
adaptiveness to student needs				
Totals				
II. Motivators:				
self-direction/selection/evaluation				
reward system				
variety				
Totals				
III. Structure:				
quality of objectives				
quality of sequencing				
quality of testing				
guidance for diagnosis and treatment				
Totals				
IV. Instructional Events (substance):				
in manual (quality of teacher props)				
in student-materials (quality of instruction)				
in management system (quality of procedures)				
Instructional Events (usage):				
appropriateness of strategies and their usage for this population.				
consistency and appropriateness of methods.				
Totals				

Selection Chart (Processes)

STUDENT MATERIALS →	System A	System B	System C	System D
ELEMENT ANALYZED:				
I. Opportunity:				
Time for learning				
increase in on task time				
increase in active teaching or guidance of student learning				
Totals				
II. Motivators:				
Advantages to student and teacher				
saving of teacher time and effort				
assistance for more effective teaching				
more student time for learning of interest to him or her				
Independent learning				
student selection of activities				
student correction				
student planning of time				
selection of work - mates				
Totals				
III. Structure:				
Process Objectives				
match to school needs				
adequacy of instructions on process				
match to student and teacher capabilities and environmental constraints				
Totals				
IV. Instructional Events				
Planning and selection of strategies				
relief from clerical, management duties				
incorporated effective instructional strategies				
strategy examples, strategy teaching etc.				
Totals				

Annotated Bibliography

The following bibliography lists the major research reports and the reviews of research which support the constructs and dimensions used in this manual. The use of these constructs for diagnosis, by analyzing the curriculum materials or instructional processes currently in use or for selection by analyzing potential new curricula or instructional processes, is different from their intended use for analysis of classroom processes. However, in keeping with the new purpose, the constructs have been redefined in terms of different dimensions or the same dimensions from a different perspective because the subjects of the analysis are the artifacts of instruction, the tangible materials used by teachers or students for teaching, learning or managing instruction.

Before listing sources which support the constructs, it seems appropriate to point out some superior general sources of research information for teachers. Volumes produced annually which provide excellent syntheses of the research are National Society for the Study of Education Yearbooks, American Educational Research Association Reviews of Research in Education and the less frequently issued Handbooks of Research on Teaching.

Specifically, particularly useful editions are the following:

Gage, N. L., ed. Handbook of Research on Teaching, Chicago: Rand McNally and Co., 1963.

Gage, N. L., ed. The Psychology of Teaching Methods, 75:1. National Society for the Study of Education, Chicago: University of Chicago Press, 1976.

Hilgard, E. R., ed. Theories of Learning and Instruction, 63:1. National Society for the Study of Education, Chicago: University of Chicago Press, 1964.

Shulman, L. S., ed. Review of Research in Education, 5. American Educational Research Association, Itasca, Illinois: F. E. Peacock, 1977.

Travers, R. M., ed. Second Handbook of Research on Teaching. Chicago: Rand McNally and Co., 1973.

Opportunity

The following studies support the construct opportunity to learn, particularly as related to achievement in basic skills. Time spent on academic content was found to be associated with growth in the area covered in all of the research studies and summary reports. Carroll, Bloom and Cooley and Lohnes have developed and defined the construct.

Armento, B. "Correlates of Teacher Effectiveness in Social Studies," Ph.D. dissertation, Indiana University, 1975.

Bloom, B. S. "Time and Learning," American Psychologist, 1974, 29, 682-688.

Bloom. B. S. Human Characteristics and School Learning. New York: McGraw Hill, 1976.

Bond, G. L. & Dykstra, R. Final Report. (USOE, HEW Project #001-OE-5-10-264). Minneapolis: University of Minnesota, Coordinating Center for First Grade Reading Instruction Programs, 1967.

Carroll, J. B. "A Model of School Learning." Teacher's College Record, 1963, 64, 723-733.

Chang, S. S. & Raths, J. P. "The Schools' Contribution to the Cumulating Deficit." Journal of Educational Research, 1971, 64, 272-276.

Cooley, W. W. & Leinhardt, G. The Application of a Model for Investigating Classroom Processes. Pittsburgh: Learning Research and Development Center, 1975.

Cooley, W. W. & Lohnes, P. R. Evaluation Research in Education. New York: Irvington Publishers, 1976.

Rosenshine, B. "Classroom Instruction." In N. L. Gage, ed. The Psychology of Teaching Methods 75:1. National Society for the Study of Education. Chicago: University of Chicago Press, 1976, 355-371.

Rosenshine, B. & Berliner, D. "Academic Engaged Time," Richard Anderson et al. eds. Schooling and the Acquisition of Knowledge. Hillsdale, NJ: Erlbaum Publishers, 1977.

Stallings, J. A. & Kaskowitz, D. H. Follow Through Classroom Observation Evaluation, 1972-73. Menlo Park, CA: Stanford Research Institute, 1974.

Walker, D. F. & Schaffarzick, J. "Comparing Curricula." Review of Educational Research, 1974, 44:1, 83-111.

Wiley, D. E. & Harneschfeger, A. "Explosion of a Myth: Quantity of Schooling and Exposure to Instruction, Major Educational Vehicles," Educational Researcher, 1974, 3, 7-12.

Opportunity (substance and usage)

The concepts of appropriate match of the instruction to needs of the student both in the substance of the instruction and its use are important dimensions of opportunity, as we have noted. Time spent on inappropriate instruction, or instruction that is not employed as it should be, clearly cannot offer the student the opportunity to learn.

Among the sources which deal with this match of instruction to student needs are the following:

Bruner, J., Goodnow, J. J. & Austin, G. A. A Study of Thinking. New York: John Wiley, 1956. (Concept learning)

Cohen, R. "The Relation Between Socio-Conceptual Styles and Orientation to School Requirements," Sociology of Education, 1968, 42, 201-220. (Relational/Analytical learning styles)

Dunn, R. & Dunn K. Teaching Students Through Their Individual Learning Styles: A Practical Approach. Reston, VA: Reston Publishing Co., 1978. (Learning styles)

Flavell, J. H. The Developmental Psychology of Jean Piaget. New York: Van Nostrand, 1963. (Developmental Stages)

Gagne, R. M., ed. Learning and Individual Differences. Columbus: Charles E. Merrill, 1967. (Individual differences of several kinds)

Hunt, D. E. Matching Models in Education. Ontario: Institute for Studies in Education, 1971. (Cognitive style)

Kagan, J. "Personality and the Learning Process." Creativity and Learning. Boston: Houghton Mifflin Co., 1967, 153-163. (Reflection-impulsivity)

Rosner, J. "Language Arts and Arithmetic Achievement and Specifically Related Perceptual Skills," American Educational Research Journal 1973, 10, 59-68.

Direct Instruction

Sources on direct instruction are separated from the other references related to opportunity because the concept of interpreting direct instruction in terms of materials is unique. The idea of direct instruction has developed simultaneously from several sources as Rosenshine has noted. Rosenshine defines it as "the time which a student spends in academically relevant material which is of a moderate level of difficulty." He calls attention to the term within the trademark DISTAR. Berliner has written of "academic engaged time." The two components of this are content covered or opportunity to learn and student attention or engagement.

While Rosenshine has suggested that research is needed to identify "engaging" materials, Smith, Rothkopf and Koether have reported that the amount of unrelated material in reading passages "predicted goal achievement better than any other formal characteristics of the nominal stimulus measured." This is the closest research available to the idea of direct instruction in materials and seems to imply that concentrated materials with little irrelevant (unrelated) material are more readily learned. Translated into direct instruction or academic engaged time, such a characteristic may be one dimension of "engaging" materials or direct instruction in materials. I have termed this "intensity of treatment." These

mentioned sources are listed here:

Rosenshine, B. "Primary Grades Instruction and Student Achievement Gain." Paper presented at the annual meeting of the American Educational Research Association, New York City, April, 1977.

Rosenshine, B. & Berliner D. "Academic Engaged Time." Prepublication paper to appear in R. Anderson, et al. eds. Schooling and the Acquisition of Knowledge. Hillsdale, NJ, Lawrence Erlbaum Associates, 1977.

Smith, M., Rothkopf, E. Z. & Koether, M. E. "The Evaluation of Instructional Text Properties." Paper presented at the annual meeting of the American Educational Research Association, Minneapolis, March, 1970.

Motivators

Writers on teaching methodology comment on interests, but as we have indicated, it is difficult and dangerous to generalize about what is essentially a characteristic that teachers must observe directly in each individual case. What children of different ages usually enjoy in reading material is discussed in the following source:

Dechant, E. V. & Smith, H. P. Psychology in Teaching Reading. Englewood Cliffs, NJ: Prentice-Hall, 1977.

The motivating affect of variety and change in activities, materials, format and responses demanded is discussed in the following sources:

Berlyne, D. W. Conflict, Arousal and Curiosity. New York: McGraw Hill, 1960.

Glaser, R. "Learning." C. W. Harris, ed. Encyclopedia of Educational Research, 4. New York: MacMillan and Co., 1969, 706-733.

Peer tutoring as a motivator is discussed in the following sources:

Cooley, W. W. & Leinhardt, G. Evaluating Individualized Education in the Elementary School. Pittsburgh: Learning Research and Development Center, 1974.

Lindvall, C. M. "The Use of Peer Tutoring in IPI Classrooms." D. T. Gow, ed., Design and Development of Curricula Materials, Vol. 2. Pittsburgh: University Center for International Studies Publications, 1976, 264-266.

The motivating effect of self direction is reported in:

Wang, M. The Self Schedule System for Instructional Learning. Pittsburgh: Learning Research and Development Center, 1976.

Reports on the effects of feedback and reinforcement on learning are well covered in the following works:

Carroll, J. B. & Chall, J. S. Towards a Literate Society. The Report of the Committee on Reading of the National Academy of Education. New York: McGraw Hill, 1975.

Gage, N. L. & Berliner, D. C. Educational Psychology. Chicago: Rand McNally and Co., 1975.

Gage, N. L. & Berliner, D. C. "The Psychology of Teaching Methods." N. L. Gage, ed., The Psychology of Teaching Methods 75:1. National Society for the Study of Education. Chicago: University of Chicago Press, 1976, 1-20.

Hamblin, R. L., Buckholdt, D., Ferritor, M. H. & Blackwell, L. B. The Humanization Processes. New York; John Wiley and Sons, 1971.

Lumsdaine, A. A. & Glaser, R., eds., Teaching Machines and Programmed Learning: A Source Book. Washington, DC: National Education Association, 1960.

Stallings, J. A. & Kaskowitz, D. H. Follow-Through Classroom Observation Evaluation; 1972-73. Menlo Park, CA: Stanford Research Institute, 1974.

Structure

The following works discuss the concept of structure of a discipline and describe procedures for writing objectives and structuring instruction:

Ausubel, D. P. "Some Psychological Aspects of the Structure of Knowledge." Stanley Elam, ed., Education and the Structure of Knowledge. Chicago: Rand McNally, 1964, 221-249.

Bloom, B. S., ed. Taxonomy of Educational Objectives, Handbook 1: Cognitive Domain. New York: Longmans, Green and Co., 1956.

Bruner, J. The Process of Education. Cambridge: Harvard University Press, 1960.

Gagne, R. The Conditions of Learning. New York: Holt, Rinehart and Winston, 1965.

Gow, D. T. Design and Development of Curricula Materials, Vols. 1 and 2. Pittsburgh: University Center for International Studies Publications, 1976.

Krathwohl, D., Bloom, B. S. & Masia, B. Taxonomy of Educational Objectives, Handbook 2: Affective Domain. New York: David McKay Co., 1964.

Mager, R. F. Preparing Instructional Objectives. Belmont, CA: Fearon Publishers, 1962.

Schwab, J. J. "The Concept of the Structure of a Discipline." Gow, D. T., ed., Design and Development of Curricular Materials, Vol. 2. Pittsburgh: University Center for International Studies Publications, 1976, 16-23.

Instructional Events

The following studies provide some information on the effects of different instructional activities on different kinds of students:

Brophy, J. E. & Evertson, C. M. Process-Product Moment Correlations in the Texas Teacher Effectiveness Study: Final Report. Austin, TX: University of Texas, 1974.

Rosenshine, B. "Classroom Instruction." N. L. Gage, ed., The Psychology of Teaching Methods, 75:1. National Society for the Study of Education. Chicago: University of Chicago Press, 1976, 335-371.

Stallings, J. & Kaskowitz, D. H. Follow-Through Classroom Observation Evaluation, 1972-73. Menlo Park, CA: Stanford Research Institute, 1974.

The following sources provide information on the use of behaviorist instructional strategies: cues, prompts, feedback, reinforcement, successive approximations, etc.:

Bandura, A. Principles of Behavior Modification. New York: Holt, Rinehart and Winston, 1969.

Homme, L. & Tosti, D. Behavior Technology. San Rafael, CA: Individual Learning Systems, 1971. (Self instructional)

Taber, J. I., Glaser, R. & Schaefer, H. H. Learning and Programmed Instruction. Reading, MA: Addison-Wesley, 1965.

Thoresen, Carl E., ed. Behavior Modification in Education, 72. National Society for the Study of Education. Chicago: University of Chicago Press, 1973.

The following are excellent sources for cognitive instructional strategies:

Ausubel, D. P. Educational Psychology: A Cognitive View. New York: Holt, Rinehart & Winston, 1968.

Ausubel, D. P. "The Use of Advance Organizers in the Learning and Retention of Meaningful Verbal Materials." Journal of Educational Psychology, 51, 1960, 267-272.

Bruner, J. S., Goodnow, J. J. & Austin, G. A. A Study of Thinking. New York: John Wiley and Sons, 1962.